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Are science and politics, long ignored, to become a healthy mix?

by I. Cinman

If Canada's academics and researchers can have it their way, the coming federal election will be fought in part on the basis of what scientific research and development and the Liberal government's science policy can do for this country.

The scientists' concerns are based on several indicators which underscore the plight of Canada's R & D sector and what many scientists describe is almost shocking disinterest shown by the current government towards Canada's declining performance in the last ten years.

According to the Organization for Economic Co-Operation and Development, in the decade between 1965 and 1975, Canada's investment in the R & D sector fell below that of other western industrialized nations.

R & D funding drops

As shown in a special report on the status of Canada's Research and Development elsewhere in this issue of the **Bulletin**, by early 1976, owing primarily to the Liberals' "neglect of science", actual federal expenditures on R & D had fallen to less than 0.5% of this country's G.N.P.

Only 0.1% of this figure was earmarked for university research and only 0.1% found its way towards industrial research — the two most productive areas for such expenditures. Thus, say researchers, the minimum goal of 2.5% of the G.N.P. targeted for Canadian R & D by the Lamontagne Special Committee on Science Policy will never be met.

From 1969 until mid-1977, the amount of money the government appropriated for scientific research failed to keep pace with inflation. Bud Drury made it clear, while Minister of State for Science and Technology, that this policy was deliberate.

What the governement lacks, some rearchers have been saying in desperation, is not just foresight in judging the value research and development adds to the general economic well-being of the nation, but also a genuine sympathy and understanding of a particularly vital, yet increasingly impoverished sector of Canada's economy.

A spark of optimism was struck when Hugh Faulkner was named to the Science and Technology portfolio to replace Mr. Drury. Armed with "I'm here to learn" attitude, he appeared to be more sympathetic and perhaps more genuinely interested in what academics and scientists had to offer than his predecessor had been. Some have said that he was instrumental in reducing the hostility between the government and the research community through his accessibility and such steps as delivering on a promise to increase funding to the granting councils — at least enough to keep up with inflation.

Euphoria dampened

The mild euphoria that swept the research and academic communities following this step was unfortunately short-lived. Faulkner was shifted to another portfolio, and few acts on the government's part since then have dispelled a new dark age which researchers say has again descended over the land.

In the area of medical research the government claims that it has increased the budget for the Medical Research Council by 7.8% over last year. But the increase, says Dr. John Cowan of the Canadian Federation of Biological Societies, appears to be only 3.8%. With the estimated 12-18% inflation rate hounding the cost of medical research, between $66-69 million will be required for 1978-1979, just to keep up with inflation, he adds. The effect of the short-fall has already been felt at the MRC, where 280 of the 1350 qualified researchers funded last year, or 20%, were suspended last month.

In addition, the government has proposed that the Tariff Board re-examine the question of exemptions from duty of certain equipment and materials currently in use on university campuses.

If the Tariff Board goes ahead with the changes, the universities can expect to spend some $20 million over and above their current expenditures, says the Canadian Association of University Business Officers.

If the Finance Minister's recent budget is any indication. Mr. Chrétien and the government appear to be favouring industrial R & D in the manufacturing sector, by introducing tax credits. CAUT has supported this move insisting however, that all three sectors — industrial research, the universities and government-run laboratories — ought to benefit equally. It is interesting to note that during recent testimony before the Tariff Board, the Canadian Manufacturers' Association said that the government's tax credit proposals will have a minimal impact on the manufacturing sector.

The Minister of State for Science and Technology, Judd Buchanan, recently announced a $5 million federal "make work" program, whereby engineers and technicians currently employed in government and university labs would be given projects in the industrial sector and whose salary, up to $14,000 per year, would be paid through federal funds.

But at the same time, through cuts in grants to the National Science and Engineering Research Council, the government has caused a loss of approximately 100-150 jobs in this sector, says Dr. Cowan.

The scientific sector, hardest hit and certainly in need of a financial boost, is not the only area where government funding has been less than adequate.

For the first time, government financial assistance to the arts disbursed by the Canada Council has declined for 1976-77 in terms of real dollars, while assistance to the humanities and social sciences registered its fifth consecutive decline, according to a recent Canada Council annual report.

A total of $32.55 million in grants and services was allocated to the arts, with the humanities and social sciences receiving $27.8 million. The figures represent an amount which is more than last year's but are deceptive, argues the Council, since if inflation is taken into account, the figures for 1977 represent a real decrease in the aid offered by the Council.

Lobby takes shape

There is, however, one essential difference in academics' and reserachers' attitudes to government actions. Rather than meekly accept Ottawa's lack of policy on the R & D issue, the nation's academics and researchers decided to "go public".

A consortium of research and academic organizations, including the CAUT, the Canadian Federation of Biological Societies (CFBS), the Canadian Society for Clinical Investigation (CSCI), the Canadian Association of Physicists, (CAP), the Chemical Institute of Canada (CIC), the Humanities and the Social Sciences Research Council (HSSRC), the Scientific Engineering and Technological Community of Canada (SCITEC) the Canadian Physiological Society (CPS), Canadians for Health Research (CHR) and others, is engaged in trying to impress on the government the need for a long-term national science policy. It is lobbying members of parliament of all parties and publicizing research activities so that the general public will become fully aware of the role adequately-funded scientific research and development can play in pulling this country's economy out of the current slump.

The lobbies and accompanying campaigns are beginning to bear fruit. There can be little doubt that the consortium has helped the opposition parties to make research and development an election issue.

There are 49 federal ridings in this country which have universities or university colleges, and this alone may insure that the broad question of a national science policy and federally-assisted research in Canada may become a serious election issue.

Anticipating a federal election, the CAUT and CFBS are preparing a series of all candidates' meetings in university ridings. They are designed to elicit candidates' attitudes and party policies on issues relating to post-secondary education and research and will provide incumbent M.P.s with an opportunity to explain and defend their government's policies on such issues as research funding.

The whole question of R & D is growing in popularity as well, owing to the increasing public awareness of the impact that scientific research plays in a nation's development. Groups such as the Canadian Federation of Agriculture are concerned about government cuts in spending on machinery research. The Agricultural Institute of Canada calls for greater effort in the industrial area, but cautions "that this must not be accomplished at the expense of established research teams in either government or university..." The only solution, the AIC says is to increase expenditures for research in the three areas: government, university and the private sector. Added to this is the public's genuine curiosity and interest in scientific developments in general.

Many researchers feel that this newly-developed public interest alone may generate some very interesting questions that political leaders will have to answer during the campaign for the coming election.

Opposition challenge

To be fair, parties in the opposition, particularly the NDP which in July of

Cont'd on p. 2

In this issue...

Report condemns McGill p. 3

NDP Leader on research, the RCMP, freedom of information p. 4

Book reviews p. 17

Economic benefits p. 28

RESEARCH and DEVELOPMENT IN CANADA

a special report: page 8

HEALTHY MIX... *from p. 1*

last year went on record favouring broad measures to restore funding for basic and applied research to the tune of at least 2.5% of the G.N.P. within three years, have been vocal in protesting the slow erosion of Canada's R & D potential.

In a recent interview with the CAUT, NDP leader Ed Broadbent said that research and development, particularly in the manufacturing sector, is a major problem in Canada when compared with other countries' performance. The villain, says Broadbent, is foreing ownership, and government attitude which does nothing to envoke safeguards preventing subsidiaries from ingesting public funds given out by the federal government as incentives for development and then moving their operations out of Canada when the economic conditions stiffen.

"No other country has a degree of foreign ownership in its manufacturing sector that Canada has. . . The parent firms concentrate their R & D in their home countries, whereas R & D should be done here. The technological benefits that come from that should reside in this country and not be transfered to a parent firm in another country or even exported by Canadian multinationals.

"The kind of policy the government has been following — wanting to get out of R & D — is mistaken. . . Research at the university level is important for long-range projects that may not have any direct connection with short-run benefits. They may, however, have long-range implications.

"To abandon that concern is not only in the short-run to abandon what ought to be an appropriate intellectual concern of stimulating new discoveries in general, but it would also mean to abandon encouraging research which, though it may not result in producing a direct commercial product, may nevertheless have practical relevance very frequently down the road," says Broadbent.

The Conservative Party Leader Joe Clark moved a motion in the House last March which called for 2.5% of the G.N.P. to be spent on R & D by 1985.

In addition, the Conservatives saw the need for a significant increase in the research and development tax credits for Canadian industry and urged the government to "extend the tax credit system to provide incentive for new employment in industrial research, design and development."

Says Robert Howie, a Conservative M.P. for York-Sunbury and his party's science and technology critic: "It has always been the policy of our party that effective Canadian economic development can only come in a balanced economy. The fact that we do not have the sort of innovative structures for the promotion of technological advance is both a cause and a symptom of the economic malaise.

"Nearly every society in which innovation is taking place at an adequate pace has a significant element of government leadership in the R & D sector. . . Government activity in support of science is virtually a precondition for a successful R & D effort. At present, Canada does not even meet this pre-condition."

Similarly, two months ago the Social Credit Party adopted a resolution which calls for the development of a long-term science policy for Canada, based on adequate funding, with the increase in R & D expenditures at 2.5% of the G.N.P. by 1985. (Half of the funds are to come from the public sector, while the other 50% will come from the private sector.) The Socreds also called for greater consultation and cooperation between government departments and scientific organizations.

"The blame for the catastrophic situation (in Canada's research and development sector) and the demoralization of the members of Canadian scientific community belongs to the Trudeau government which has been in power since 1968," says Gérard Laprise, the party spokesman.

And the government?

Perhaps it is not fair to use the opposition and their platforms to quote to the government its own sad record on underfunding the nation's research and development.

Independent studies have substantiated that Canada's record of performance in the R & D sector is appalling while researchers, academics and concerned citizens have clamored for the need to take steps which would offset Canada's dramatic decline as a scientific and technological pace-setter. Opposition parties went on record urging comprehensive long-term improvements in our science policy, while government-appointed commissions decry the lack of government effort and urge a reassessment of emphasis.

In reply to this we have the Prime Minister saying at his home constituency of Mt. Royal last month that the position of the opposition parties to increase funding to 2.5% is a joke.

The joke, say Canada's academics and researchers, is beginning to wear thin.

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Memorial to certify— regents call special plan "window-dressing"

The Faculty Association at Memorial University has instructed its Executive to proceed to certification under the labour legislation of Newfoundland.

This decision came after protracted discussions between the Faculty Association, assisted by CAUT, and the Board of Regents concerning the possibility of creating a special plan collective agreement outside of labour legislation. The Board of Regents replied that such a plan would constitute voluntary recognition under the law and was, therefore, legally untenable other than as a variety of bargaining under labour legislation. It suggested that special plans were "window-dressing" and were "an illusory concept insofar as they are intended to enhance the rights and protections of faculty members and librarians".

The President wrote to the faculty attempting to draw to its attention certain drawbacks to collective bargaining. He doubted the bargaining could secure higher salaries. He suggested that orderly procedures for redundancy could be mutually agreed to through present avenues, that any desire for increased participation could be met through discussions with the President, and stated that it might be "overly optimistic" to assume that negotiations would commence with the present terms and conditions as a base. "It must be remembered", he stated, "that the University may insist on certain 'management rights'. . ."

Various problems were aired at the general meeting of the Faculty Association which instructed the Executive to proceed to certification. These involved ad hoc arrangements and lack of faculty influence in the creation of a rational salary structure; the rectification of salary inequalities; the management, investment and control of the pension funds; sabbatical policy; travel funds; maternity leave; the increasing use of part-time and term contracts; procedures for choosing departmental heads.

Questions were raised concerning the degree of collegiality when the President unilaterally terminated free tuition for dependents, eliminated assisted housing and abolished the housing office, and garnisheed the pay cheques of faculty at Cornerbrook until the Association threatened legal action. Questions were also asked about the reality of collegiality when there seemed to be little or no consultation about the appointment of the first and second principals at Cornerbrook, on the creation of new vice-presidencies and the appointment of the Dean of Junior Studies.

The Association has also been faced with a variety of individual grievances from members during the past few years, including a recent non-renewal where the faculty member is alleging that the grounds are political discrimination.

We'll get it right yet department...

In the article "Tell the government how much your 1978 test-tube really costs" which appeared on p. 6 of the February 1978 issue of the **CAUT Bulletin**, the report "Conversion Factors and Levels of Federal Funding of Science" was incorrectly referenced. This is a reprint of the Science Council of Canada, not of the Ministry of State for Science and Technology as reported. The author regrets the error.

McGill regulations on faculty employment fall short of ideal, says report

McGill University regulations governing employment of teachers and administrative staff in many instances violate the CAUT Guidelines on tenure, says a three-man committee of inquiry charged with investigating terms and conditions of employment for faculty at McGill University. The inordinate length of time which may elapse before a person acquires tenure is singled out for particular criticism.

In an extreme example, says the committee, McGill regulations may allow a person to remain in the "tenure stream" without being considered for tenure, for up to 14 years (five years as "university lecturer", six years as assistant professor and three years as associate professor).

A more typical arrangement may see an individual spend six years as assistant professor, followed by five years as associate professor before the tenure decision is reached.

"That is still eleven years of probationary status, far more than the five years recommended by CAUT Guidelines", says the committee, and very far removed from the "up-or-out" decision called for by the CAUT Guidelines.

Investigation committee

The committee — Prof. Gideon Rosenbluth, U.B.C. (Chairman), Prof. R. D. Chambers, Trent, and Prof. R. J. Gray, York — was struck jointly by the Canadian Association of University Teachers and the McGill Association of University Teachers (MAUT) to "investigate whether the present policies of McGill University in relation to renewal, tenure or dismissal of faculty or their removal on the grounds of financial exigency are fair and equitable, and to investigate whether faculty members at McGill University hired under contractual arrangements which existed prior to the establishment of the present regulations on renewal of tenure, dismissal and financial exigency have or should have accrued rights which should be legally recognized by McGill." The committee released its report last month.

Moral tenure

Reviewing the history of development of tenure regulations at McGill, the committee found that the 1950's, 1960's and early 1970's were marked by very long periods of appointment at probationary level, in effect creating a concept of "moral tenure" or *de facto* tenure.

"The very long probatinary period had the effect of creating an ethos in which the tenure decision was not thought to be concentrated into a single act at a specific moment in time, but rather spread amongst a series of earlier decisions, each one of which increased the probability of tenure being finally granted," says the committee.

"When one compares McGill's regulations with those in force at other universities one cannot escape the conclusion that McGill's regulations seem designed to delay and obstruct the attainment of tenure."

The committee is extremely critical of the time it took McGill officials to develop a new set of regulations and procedures. The university allowed the Senate-appointed body charged with the drafting of regulations to spend four years (1969 to 1973) putting together a four-page statement of policy document, along with a ten-page set of regulations. Then, the saga goes, the Senate struck three different *ad hoc* committees, finally adopting a report in 1976, which in all essential points mirrored the very first set of proposals.

"It was unfair for the faculty at McGill to allow this discussion to spread itself so wastefully, and as a result create such uncertainty over a seven-year period." Moreover the new regulations failed to resolve some outstanding issues. According to the CAUT-MAUT committee, the first Senate Committee identified the major problem as the inordinate length of the probationary period before granting of tenure, but the new regulations fail to reflect this concern.

Linkage violates guidelines

McGill's tradition of linking promotion and tenure deviates from CAUT regulations since historically, tenure at McGill was given only to associate or full professors.

This arrangement contributes to violations to CAUT Guidelines, says the report, for "it is common for faculty members not to be promoted to these ranks before the end of the maximum probationary period."

The report suggests that some universities, such as McGill, often resort to long probationary periods for political reasons, as a means of ensuring that an individual performs his or her duties without unduly disturbing the status quo. "If the real justification for tenure is the value to society of honest criticism and independent judgement, then tenure has very little to do with rank", says the committee, quoting the CAUT Primer on Tenure.

Another postulated reason for lengthy probationary appointments is the shock of current or future financial stringency threatening universities. At McGill, the committee perceived a "widespread conviction that it is easier to meet budget cutbacks by non-renewal of probationary appointments than by dismissal of tenured faculty", when economic gloom sets in. Thus, a university may quite consciously create a pool of untenured faculty, who float from one probationary appointment to another, fearful of the day when the administration, threatened by financial constraints, may decide to pull the plug and empty that pool.

Criteria ambiguous

Several clauses in the McGill regulations, particularly those governing definition of criteria for tenure, are singled out for criticism by the committee.

In particular, the committee found that ambiguities in the designation of the criteria for tenure may allow the introduction of inequity or inefficiency. Moreover the inclusion of "sufficiently serious" incompatibility with colleagues as a criterion for tenure in the McGill regulations violates the CAUT Guidelines, which state that "personal or social incompatibility should not be reason for denying tenure."

An unusual feature of McGill regulations, notes the committee, is that they impose heavy responsibility and onerous costs on the candidate for tenure. The candidate must, at own expense, create and present five copies of a comprehensive dossier containing details of his research, teaching, other scholarly activities and contribution to the university.

In addition, the candidate must negotiate with his chairman to reach agreement on a list of six external evaluators he is permitted, and hence will feel obliged to argue his own case before the tenure committee, and if he wishes to be considered at the earliest time that the regulations permit, he must take the initiative in demanding consideration.

According to the report, "tenure appears to be viewed by the authors of the regulations as a prize which an aggressive candidate must wrest from a reluctant university (when he has matured sufficiently in service) using all the arts of salesmanship and at no little expense of effort and money."

"Efficiency and fairness demand that the granting of tenure should not depend on the candidate's eagerness, skill, effect and expense in seeking it, but on an objective evaluation of his qualifications, performance and potential.

"A candidate should not be required to spend any of his own money in pursuit of tenure. He should be required to 'sell' himself only to departmental colleagues (who understand what he is doing) principally by his actual performance in teaching, research and administration. Selling the case to the higher review authorities should be left to the experience and skill (and xeroxing budgets) of the department chairman and dean."

And the committee makes an emphatic claim for tenure consideration to be mandatory after a reasonable probationary period and not be dependent on the candidate's initiative.

Dismissal regulations deficient

Altough McGill regulations governing dismissal for cause conform with the CAUT Guidelines on academic appointments and tenure, both are deficient, says the committee, since they do not say who is to bear the costs of arbitration proceedings, which may be quite high. A possible solution, according to the committee, is for the university to provide secretarial and duplicating services for both parties as well as space and furnishings for the proceedings. The university and the faculty association should share remuneration and expenses of arbitrators, while the faculty association should pay for the member's legal council, if such services are used.

There is little in the way of university-wide policy that governs criteria or procedures for the renewal of fixed term appointments argues the committee, adding that a one-year notice should be made mandatory for termination of a two or three year appointment.

Although nowhere in the McGill regulations is there mention of *de facto* tenure as a category of permanent appointment, and while several witnesses before the committee scoffed at claims of its existence, most witnesses readily admitted their belief that in addition to *de jure* tenure status, familiar to most universities, *de facto* tenure also existed at McGill.

For its part, the committee quite unequivocally states that it believes that *de facto* tenure (or status of permanent appointment) existed at the university before the introduction of the 1976 regulations. Since such status existed in the past, but is not recognized under the new regulations, "nor is any provision made in the scheme to protect the rights and privileges of faculty members who had acquired or were nearing the time of achieving such status," there is no doubt, says the committee, that the new regulations are a "major infringement upon the accrued rights of a substantial number of McGill faculty members."

The committee admits to a sense of anxiety as the result of its impression that McGill Senate and administration have a "casual attitude to existing regulations." It cites a recent case where interpretations of the new regulations, beneficial to a faculty member, were ignored by the administration.

Whether based on a misunderstanding of the provision, or a conscious disregard of the regulations, such attitudes may lead to a serious crisis of confidence and good faith at the university — problems which McGill, nor any other university for that matter, can afford to confront at the moment, says the report.

The CAUT and MAUT are currently examining a number of alternative methods to have the controversial Rosenbluth recommendations implemented by the administration.

Don't want no foreign students round here...?

by R.J. Gathercole

A recent study undertaken by the Canadian Bureau of International Education estimated that 23,450 foreign students were enrolled in Canadian post-secondary educations in January 1977. We have traditionally encouraged foreign students to come to Canada and not from purely altruistic motives. There has been a general consensus that foreign students have had a very positive influence on Canadian post-secondary education.

However, separate but related actions by provincial and federal governments in Canada suggest that foreign students are no longer so welcome. Alberta, Ontario and Quebec have instituted or are instituting differential fees for foreign students. Although the CAUT, CBIE and other organizations have effectively questioned the merits of differential fees, their views have had little impact. Provincial governments have been influenced primarily by the prevailing public concern with the costs of higher education and a perception that foreign students are contributing to higher costs. As a result, post-secondary institutions are faced with the necessity of developing some means of controlling the enrolment of foreign students. At the CBIE Conference in Toronto early this year the consensus was that some alternative to differential fees had to be developed and the most logical alternative was some form of quota. In fact, there were indications that some universities already had a *de facto* quota system in operation.

Some of the pressure on post-secondary institutions may well be alleviated with the introduction of the new Immigration Act. The Act and supporting Regulations, which came into effect on April 10, make it more difficult for foreign students to gain admission to Canada. Under section 10 of the Act, foreign students must obtain a "student authorization" from an overseas visa officer before coming to Canada. This authorization is in addi-

Cont'd on p. 6

More R and D; a comprehensive freedom of information law and no security police on campus, says NDP

As a federal election approaches, Ed Broadbent, the leader of the New Democratic Party, talks about his party's performance in the House in areas of significance to Canada's academics and researchers.

The interview was conducted by CAUT Executive Secretary, Dr. Donald C. Savage.

The first area that our members are interested in is that of Research and Development. I wonder whether first of all you could say a word or two about the general NDP stand on R & D and what you think the proposals in the recent budget might do and don't do in that area?

Research and Development is a major problem in Canada. Compared to any other industrial nation, our level of spending on R & D is deplorable, particularly in the manufacturing sector within the economy. The "villain" in the piece is not very hard to identify. The problem is inextricably connected with the problem of foreign ownership. No other country has a degree of foreign ownership in its manufacturing sector that Canada has. The reality is, of course, that parent firms concentrate their R & D in their home countries. The kind of approach taken in Mr. Chrétien's budget does not take into account this reality at all. All that the government is doing is taking a skatter-gun approach, giving more money to industry for R & D, but by-passing the really central problems of foreign ownership. As long as that problem is not dealt with, serious R & D developments will go untouched in this country.

Do you think there should be any safeguards attached to moneys that Mr. Chrétien intends to pay out? For instance, in the case of RCA in Montreal, the firm took a lot of money from the federal government and then decided to move everything back to New Jersey.

Exactly! That kind of problem we've already objected to in the House. The existing structures should have safeguards built into them about R & D being done here. The technological benefits that come from that should reside here and not be transfered to a parent firm in another country or even exported by Canada's multinationals.

What role do you see for research in the university area and government area in terms of our R & D policy? It seems that Mr. Buchanan sees R & D in terms of something being done exclusively by the private sector in this country.

I think that there has to be both. We need private sector R & D. We need business to do more. I think that the kind of policy the government has followed — wanting to get out of R & D — is mistaken. Particularly, but not exclusively, R & D at the university-level is important for long-range projects that may not have any direct connection with short-run benefits. They may, however, have long-range implications. To abandon that concern is not only, in the short-run, to abandon what ought to be an appropriate intellectual concern of stimulating new discoveries in general, but it would also mean to abandon encouraging research which, though it may not result in producing a direct commercial product, may nevertheless have practical relevance very frequently down the road.

Is the NDP satisfied with the current levels of support by the Federal government for the three granting agencies?

No, not at all. This is the easiest area politically in the short-run for the government to cut back.

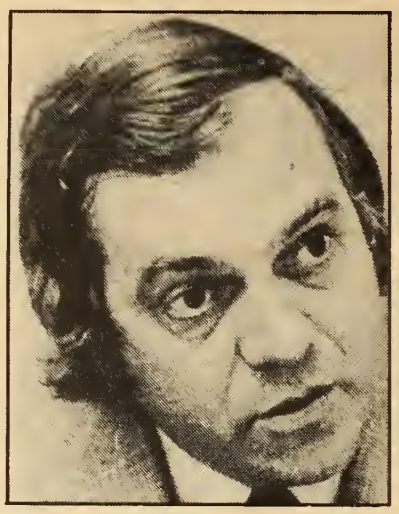
The CAUT has been interested for some time in the matter of Freedom of Information legislation. Is the NDP interested in the Freedom of Information legislation, along the lines that have been suggested, for instance, by Mr. Baldwin?

Very much so. We wanted to go at it in a much more thorough way than the government's latest moves toward Freedom of Information, particularly about one's personal files. For example, the whole question of research being done — whether it is in the social sciences, the natural sciences, economics etc., and the millions of dollars annually we spend here in Canada for the big departments to do research on something, prepare background policy position — and then the results rest almost embalmed in some government file. This is totally unacceptable to us. This aspect of material being virtually permanently hidden from the public, I think is totally unacceptable. I would argue that unless something is pretty directly related to security matters, it should be available to the public as a right. If ordinary taxpayers are funding this, they should have a right to see what is being produced in their name.

I would also argue that if we're going to move towards a real change in the government's attitude in the development of national industrial strategy, if we are going to have the government get involved in a major way in economic planning, it is all the more reason why the MPs and their constituents ought to have very systematic access to all the information that the government has on file. Enjoying access to this information, they will be able to contribute, in a serious way, to debate.

The Government says that if the Freedom of Information legislation was brought in which allowed either for a parliamentary commission or for the courts to review refusals by departments to produce papers, this would destroy the concept of "ministerial responsibility" to the House of Commons.

That is absurd ! Rather than make that blanket assertion, the government should try to defend itself. In all the serious issues involving ministerial responsibility that have come up, whether it is in the "Judges Affair" or the RCMP matters, it is this government that has systematically ignored the tradition of ministerial responsibility. To hear them invoking it in this context is certainly bizarre, but in fact, fully consistent with their basic view, which is that ministers are not really responsible to anyone. Rather than admitting that, the government is



saying the notion of responsibility entails keeping everything secret, and that is absurd.

You mentioned the security forces, and that is another area in which the CAUT has been interested in for a very long period of time and in which indeed the NDP over the years have aired a number of concerns that we've had. We have recently submitted a brief on the Security Forces to the government and I would like to ask you a question on one specific matter which has come to light last November during our discussions on the subject with the government. Mr. Barney Danson said that members of Security Forces and the Armed Forces who were taking university courses in 1970 and 1971 had been instructed to report on the political views of their professors and their fellow students. I wonder what your reaction to that kind of use of the security forces is.

To me personally, and to everything that my party has stood for, quite literally going back to the days of J. S. Woodsworth, that position is an abomination of what a decent, civil libertarian society should be all about. To have the state police or agents of the state police, monitor the teaching and learning process in a university, or in any learning situation is totally unacceptable in a free society.

One of the ironies of Canadian history is that it has been the CCF and the NDP that has had to defend classical small "l" liberalism in this country, and the party that has abandoned it most systematically has been the party that goes by that name. In terms of civil libertarian matters, we incorporate, accept and practice what we preach on that score. In the past the CCF came to the defence of the right of Japanese Canadians when at the outset of W.W.II the Liberals and Conservatives were interested in prosecuting and persecuting them. If we think of the War Measures Act, one would have thought that small "l" liberals, if they existed in the Liberal party, would have been outraged at that abomination. They weren't. It was the NDP of course that protested. I make that kind of extended answer to the question because I see it being connected. The learning process, in particular, ought to be free of the implied coercion of the state which will be there when you have agents, either directly or indirectly, representing the RCMP or security forces on campus.

Over the past twenty years there have been a succession of causes celebres involving the desire of universities to offer contracts to particular professors abroad who happen to be distinguished in one area or another and finding that some of these professors were denied entry on the grounds of "national security". CAUT has called for the government to set up a mechanism to replace the discretion of the minister in these cases with an adjudication IN CAMERA. Does that sort of approach sound reasonable to you?

Indeed, it is quite reasonable. In fact I was directly involved in one such case, that of Istvan Meszaros. As a result of that case, Istvan Meszaros and I became good friends. I took up that case with the then minister of Immigration. Bryce Mackasey who waffled all over. If he had gotten his way, Istvan would have been kept out of the country. But there was a change of ministers and Robert Andras came in. At least to his credit he looked into it and took the right steps in that particular instance. But that very success on his part illustrates the need for the kind of procedure that you are recommending — that is the issue ought not to be settled on particular whims, whether they are good or bad, of a particular minister.

As we move towards a federal election, is there anything else that you'd like to say to the university community?

I would like to say to all people in the university community who are thinking seriously about their country as well as their own self-interest, people who believe in an open society, in one that respects the rule of law, believe in a society that encourages more research and development, that there is absolutely no doubt in my mind which party in this parliament has stood up for all of those issues, and that has been the NDP. When votes have come, when speeches had to be made — on the RCMP affair, cutbacks in university research, for example — it has been the NDP that has taken a systematic position in defence of civilization in Canada right now. If, to use and old metaphor, one were to choose between the forces of light and forces of darkness, there is no doubt in my mind who is on what side.

If Canadians in the university community are concerned about achieving a greater degree of equality in Canada they must be perturbed that after years of Trudeau, inequality in fact has increased. The poor have marginally less of the share in the national income now than they had in 1968. Not a big change but a marginal change downward. In fact, the change ought to have been a narrowing of the gap.

Income inequality has increased. The very serious problem of restructuring Canadian economy, of really getting a viable industrial nation, has been virtually abandoned by the Liberals and has not been taken up at all by the Conservatives.

On almost all scores of policy — industrial strategy, civil libertarian matters, employment matters — I think the NDP has the right approach and the others, if they had any ideas, have put them in obeyance.

Most of your criticisms have been levelled against the Liberal party. If I were a disenchanted professor, why shouldn't I vote for the Conservatives?

Well, if the Liberals have seriously botched the obligation to manage a mixed economy, the Conservative party now doesn't even acknowledge the problem exists. I personally don't believe there is a significant distinction to be made between the Liberals and the Conservatives. They are both basically in defence of the status quo and in the context of Canada in 1978 they both have moved to the right on economic as well as social matters. If one is in the university community and you want that, by all means... If you want a change you can have a right-wing Conservative party as opposed to a right-wing Liberal party. But it would be deluding oneself if you think you are going to get any difference in policy by voting for Conservatives.

Ottawa notes

by Jill Greenwell (CAUT)

Trudeau Called Liar

Dr. John Cowan of the Canadian Federation of Biological Societies has called the Prime Minister a liar for claiming in a letter addressed to the CFBS dated 13 March 1978 that the MRC budget has increased 7.8%. The increase, according to Dr. Cowan, appears to be only 2.8% — while others, including Liberal MP Gus MacFarlane, claim that it is 5.8%.

According to the main estimates, the 1977-78 MRC budget was officially $56.718 million and the proposed 1978-79 budget is $61.1 million — a 7.8% increase. However only $60 million will actually be provided this year because $1.1 million of this year's budget was advanced to the MRC last year so that researchers could comply with new regulations requiring the mandatory use of biohazard safety equipment and facilities. The MRC therefore spent a total $57.8 million on research in 1977-78. The difference between last year's actual expenditures and the $60 million actually available for research this year is $2.2 million or 3.8%. If the $1.1 million is totally ignored, the difference between last year's $56.718 million and this year's $60 million would amount to $3.3 million or 5.8%.

Some of the results: Of 600 applications for new projects this year, 420 (70%) were considered of sufficient scientific merit to deserve funding, but only 180 (30%) were funded. Of approximately 1355 applications for renewal grants, 280 (20%) were refused (the natural attrition rate for such projects is normally about 10%). No applications for major research equipment were funded.

With an estimated 12-18% inflation rate in the cost of medical research, between $66-69 million would be required for 1978-79 just to keep pace with inflation.

The Canadians for Health Research has called on its members to write to the Prime Minister and the Minister of National Health and Welfare protesting this year's MRC budget allocation.

Senate Committee Studies Mandatory Retirement

The CAUT expects to submit a brief ot the Special Senate Committee on Retirement Age Policies in the fall of 1978. Established in January 1978, the Committee, chaired by Senator David Croll, will examine and report on existing retirement age policies, the social and economic implications of mandatory retirement based on age alone, the feasibility of flexible voluntary retirement plans, protection against age discrimination in employment for those over 65 years, and the need for coordination between governments, unions, business and the public. The Committee hopes to commence its study later this year.

Attempting to reconcile the individual's rights against forced retirement and the interests of new and young Ph.D.s will present a particular dilemma to the academic community which is currently faced with a stagnant job market, a substantial proportion of faculty not expected to retire until the 1990s, and an annual crop of new Ph.Ds unable to find jobs. Those interested in raising issues for possible inclusion in the CAUT brief are invited to write to Dr. Donald C. Savage, Executive Secretary of CAUT.

Lobbying Consortium Likely to Expand

Several national labour and business organizations, including the Canadian Manufacturers' Association, have indicated an interest in joining forces with the lobbying consortium established by the CAUT and the CFBS (Canadian Federation of Biological Societies). This step was prompted by the consortium's impressive lobbying activities in the area of research and development. Current membership of the consortium includes the Social Science Federation of Canada, Humanities Research Council, Council of Deans of Faculties of Management and Business Administration of Canada, the Canadian Association of Graduate Schools, the Canadian Association of University Research Administrators, SCITEC, Canadian Association of Physicists, Canadian Committee of University Chemistry Chairmen, Chemical Institute of Canada and the Canadians for Health Research. Representatives meet montly in Ottawa to exchange information on their respective lobbying interests and strategies. The group's collaborative efforts are based on the view that activities would be coordinated in areas of mutual interest.

Government Appoints Scientist to MRC Presidency

Dr. René Simard has been appointed full-time President of the Medical Research Council for a five-year term commencing 1 June 1988. A Professor of Pathology at the University of Montreal, Dr. Simard has served on a number of MRC committees as well as the Research Advisory Group and Grants Committee of the National Cancer Institute of Canada. He is currently President of the Health Research Council of Quebec and Scientific Director at the Montreal Cancer Institute.

CAUT Fights Possible Loss of Tariff Exemptions

Appearing before the Tariff Board, April 17-19, 1978, the CAUT urged retention of current tariff exemptions which permit universities and colleges, among others, to import a wide range of articles duty-free. The federal government had directed the Board to review tariff items 69605-1 and 69610-1. A brief submitted by CAUBO indicates that it would cost universities an estimated $20 million if these exemptions were revoked. Given the "underfunding" policies by both levels of government (through the three federal granting councils, and via operating and capital grants by the provinces) Dr. Donald Savage, Executive Secretary of CAUT, said that it is unlikely that provincial governments would increase funds to universities to meet the added $20 million cost if the federal government decided to discontinue the exemptions. Canadian manufacturers, who have been pressing for revocation of these tariff exemptions, would not only feel the immediate impact of cutbacks in purchases for university science, engineering and medical programmes, but because universities are frequently among the largest employers in Canadian cities, local economies will be affected as well.

Amnesty International

Set them free

by Jean Sonnenfeld

End the torture!

Reports of police brutality in Canada arouse cries of outrage from the media and concerned groups and individuals. The publicity-cum-outrage usually produces official attempts to stop maltreatment of suspects and prisoners.

Yet in well over half the countries of the world the cruellest forms of physical and psychological torture are an established part of the penal system. Last year Amnesty International published **Evidence of Torture: Studies by the AI Danish Medical Group.** This medical team is believed to be the first in the world to study systematically the symptoms and effects (sequelae) of torture, which they regard as a man-inflicted disease that should be studied and treated by doctors.

In some cases, the researchers were able to see skeletal X-rays taken previously. But they reported: "Undoubtedly the worst sequelae of torture were psychological and neurological." Sixty per cent of the combined groups studied displayed mental disturbance, including anxiety, irritability, depression, loss of memory, impaired powers of concentration, sleep disturbance and headaches.

When the first military police torturers' trial was held in Greece in 1975, over 100 witnesses not only described the torture which they had endured, but they showed evidence on their bodies of the beatings, electric shocks and other maltreatment they had received. Wing-Commander Minis testified that Brigadier Dimitrios Ioannidis, the presiding genius of the military police (ESA), had told him, "It is possible that some parts of your body might be destroyed."

The trial proved that during the seven years of dictatorship the Junta's military police practiced torture on a systematic scale as a means to enforce authority. Sentences of up to 23 years were handed down to the former commandants and agents of the ESA. The trial established the precedent of proving that political torture is a crime that can be punished by the ordinary process of law.

Portugal has also brought to trial some of the torturers of its old regime. Moreover, countries as diverse as Chile, the Philippines, Venezuela, Egypt and the USSR have announced the administrative disciplining of torturers, or their intention to bring torturers to trial. However, none of them has attempted to punish the officials responsible for state systems of torture.

On December 9, 1975, the United Nations General Assembly unanimously, adopted a Declaration condemning any act of torture or other cruel, inhuman or degraging treatment as "an offence to human dignity". So far no machinery has been set up to enforce this Declaration. And so it remains a piece of paper whose subject has been debated, voted for, signed — and ignored.

Amnesty International worked to bring this Declaration before the United Nations General Assembly. AI continues to pressure governments to end the use of torture through its letter-writing and publicity campaigns. In at least half of AI's "Urgent Action" campaigns it was possible to establish that circumstances had improved: torture stopped, arrests were officially acknowledged, kidnap victims were released, death sentences were commuted. A Chilean refugee in Europe attested: "Amnesty's quick and effective mobilization to pressurize and constantly keep guard. . . to prevent the assassination of detainees under torture, has contributed to save lives of many Chileans."

The events in Greece have snown that brutality can be stopped officially. For medical and humanitarian reasons it must be stopped in the rest of the world.

(**Evidence of Torture: Studies by the AI Danish Medical Group,** $1.00, and **Torture in Greece: the First Torturers' Trial 1975,** $1.70, can be obtained from Amnesty International, Canadian Section, 2101 Algonquin Avenue, Ottawa, Ontario K2A 1T1.

Amnesty International news items of particular interest to the academic community appear regularly in the CAUT Bulletin. The space is made available to Amnesty International by the CAUT as an indication of the support the CAUT extends to AI and its aims. Support of particular cases is a matter of individual conscience on the part of CAUT members.

CAUT Bulletin ACPU

Editor: I. Cinman

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Opposition shows consern over RCMP

Leaders of two federal political parties support CAUT's position that the RCMP should not in any way be engaged in general surveillance of university campuses.

In a recent interview with the CAUT, Ed Broadbent, leader of the New Democratic Party, said that to have the state police or agents monitor the teaching and learning process in a university, or in any learning institution, is totally unacceptable in a free society.

"The learning process in particular, ought to be free of the implied coercion of the state, which will be there when you have agents, either directly or indirectly, representing the RCMP or security forces on campus." Mr. Broadbent was commenting on recent reports of alleged electronic or general surveillance of students and staff.

In a letter to the CAUT, the leader of the opposition, Joe Clark, said that he is in general agreement with most of the recommendations made by the CAUT in its brief to the McDonald Commission investigating the activities of security services. In particular, Mr. Clark states that there should be no general surveillance of university campuses. "Security clearance methods are unsophisticated and in need of overhaul," he says, adding that "security service personnel require more and better training in order to better distinguish between legitimate dissent and subversion."

But while agreeing in principle on this point, that is the need for the security services to distinguish between legitimate political dissent and legal trade union activity on the one hand and criminal activity such as subversion on the other, Mr. Clark nevertheless suggests that in order to flush out subversives or "foreign agents" it is often necessary to engage in widespread surveillance.

"Much greater research is needed to bring principle into conformity with the pragmatic problem," he says.

He admits, however, that when taking university courses, members of the security service should not be reporting on non-criminal activities of professors and students.

This and other problems relating to this country's security apparatus were addressed by the CAUT in its brief to the McDonald Commission. The CAUT is excepted to testify before the Commission in early Fall.

CAUT's primary concern, reflected in its brief, is the alleged electronic or general surveillance of university students and staff. Such alleged activities, says the CAUT, infringe on an individual's civil rights, constitute invasion of privacy and pose a clear threat to academic freedom of university professors and students.

The CAUT brief strongly emphasizes the need for the security forces to draw clear distinction in their operations between legal political dissent and trade union activity on the one hand and those criminal acts commonly called subversion.

The CAUT suggests that Canadians who are denied security clearance should be allowed to review their case *in camera,* before a judge. Mr. Broadbent supports this view, while Mr. Clark prefers a federal ombudsman to arbitrate refusal of security clearance cases.

The document also states that there should be uniformity in policy dealing with wiretapping, electronic eavesdropping, mail opening and telegram interception, and that all such activities, without exception, require judicial approval.

It also recommends that serious attention be paid to the human rights content of both initial training and refresher courses for the security forces personnel.

In addition, the brief says that the members of the security forces should continue to take university courses, but that they be forbidden by their agencies to report on the political, economic and social ideas of their professors or of fellow students.

The CAUT has been pressing the federal government for a clarification of the government position on security activities and in particular on the question of a Cabinet Directive on security. So far, little progress has been made, other than government assurances that it is reviewing the situation and the indication of policy through the Prime Minister's and his ministers' remarks in the House in defence of security forces and RCMP activities. **I.C.**

FOREIGN... *Cont'd from p. 3*

tion to the student visa which must also be obtained prior to coming to Canada.

To obtain the authorization the student must, as at present, establish that he or she has sufficient financial resources to pay tuition fees and maintain himself or herself and any dependants in Canada for the period of the authorization.

Because the number of visa officers who can issue such authorizations is limited, particularly in third world countries, obtaining authorization will be a time-consuming process for many students. As well, no authorization can be issued until the institution involved has accepted the student. Given the processes employed by most universities in Canada in dealing with applications, and the fact that final decisions are often not made until late in the summer, the effect of this procedure will be to seriously limit the number of foreign students coming to Canada. A foreign student who does not obtain an acceptance well in advance of the academic year for which he or she is applying cannot hope to obtain the student authorization in time.

Under the present legislation it is often possible for a student whose documentation has not been completed to come to Canada as a visitor and then obtain a student visa when all problems have been overcome. This will not be possible under the new Act. A student who appears at a port of entry without a student authorization is in the same position as a person who wants to come to Canada permanently and appears at a port of entry without a landed immigrant visa; he or she is subject to immediate deportation. Therefore, all foreign students (except for those in the very limited exemption categories) must be advised not to attempt to come to Canada without first obtaining a student authorization and student visa.

It is too early to determine how the new Act and Regulations will be administered, but their effect, together with the move towards differential fees and quotas will be to restrict further the ability of foreign students to obtain an education in Canada.

R.J. Gathercole, at the faculty of law, University of Toronto, is member of CAUT subcommittee on Immigration.

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Send by May 31 to: Dr. D.L. Grant, Chairman, Department of Mathematical and Natural Sciences, College of Cape Breton, P.O. Box 760 Sydney, Nova Scotia B1P 6J1.

Winning the game: how to claw up the professor ladder

by Kenneth Sipser

Play for the beginner ought be limited to the categories Instructor, Assistant, Associate and Full Professor. Each has its rules for category maintenance, some of which are not at all well defined. A beginning strategy is for the player to get into the game at the most advanced level negotiable, and then to advance as quickly as possible to the level Full, which process is known as "clawing". For the more advanced player, the game may be extended to include Chairperson, Dean and President. Variations in play may be created at most any time to include such other positions as, say Assistant Dean, Associate Dean, Full Dean, even Dean of the Division of Such and so, etc. There is no highest position, since an almost infinite number of categories can be created. As a matter of fact, part of the strategy of keeping an upper post is to create as many distractions and extensions below as possible in order to make the clawing more difficult and lengthy. It is known that some go to the extent of creating such additional categories as Provost, Vice-President, also Vice-President for Such and So, etc., with appropriate prefixes: Assistant, Associate and Full.

As you can see the list can be made almost endless. Beyond President, the game may include such positions as may be determined by the Chancellor, the highest category known to date. It is argued by some that Chancellor ought not be included in the play, since a process called "teaching" is too far removed from the post. Others argue, with some merit, that if teaching is to be a criterion for inclusion, then all positions down to Assistant Professor ought be disallowed. There are some purists who go so far as to advocate playing the game only with a category called "Graduate Assistant". It is alternatively argued that the introduction of GA's to the game heightens the intensity of the play since they relieve the others of this "teaching" thing to work at clawing, which is the essence of the Game of Professor.

Since clawing is the process by which advancement is maximized, all other procedures, viz., planning, advisement and teaching are to be considered distractions, and should be minimized, and wherever possible, done away with altogether. Following is an introductory set of game strategies:

PLANNING, which is short for "lesson programming and planning", is easiest to deal with since its elimination is hardly, if ever, noticed except by a peripheral group (students). For some, this comes naturally, while others need to put the following partial list to the test:

- ☐ Consider yourself an expert in the field, and thus without need to review or plan. This results in a procedure called "Canning and Freezing", from whence come the expressions "giving a canned lesson", and "walking in cold".
- ☐ Consider planning as taking away from the spontaneity of the session. Without it you never really know how it's going to come off. As a result, most of your students will be required to get it on their own which will fix it in their minds so much the better. More importantly, it will leave you free for clawing.
- ☐ Recommended non-planned lessons: full period films, full period library research, full period exams, student consultation sessions with graduate assistants during class time, etc.

Illustration: curtesy THE TIMES HIGHER EDUCATION SUPPLEMENT

STUDENT ADVISEMENT, similarly can be handled minimally. With some practice and experience, this too can be converted into productive clawing time. First of all, posted office hours must show you available for conferencing least convenient to student schedules. Early morning and lunch hours are best since they conflict with procedures students may feel more important at the time. Also, several quickly penned notices starting with "NO OFFICE HOURS TODAY..." are always effective, or better yet, leave no note outside the locked door, and students will quickly get the message. If a student calls and happens to catch you in, arrange a meeting three weeks hence, constantly complaining about your busy schedule.

However, there may be times when a student will walk in and catch you at your desk. Bad news !! A proper response strategy is quickly to advise the prospective advisee of another meeting "just at this time", walking student to the door and suggesting another try the following day. Make sure student will find "NO OFFICE HOURS TODAY..." notice next time. There are in fact many variations to this theme, and these need to be developed with great care, since student advisement is time-consuming and distracting, adding nothing to clawing effectiveness.

TEACHING can be a major problem for those who are required to do that sort of thing, since the ordeal is a recurring one, two or three times every week for each class assigned. This may require from eight to ten or even perhaps (heaven forbid) twelve hours instruction each week, demanding increased attention to Planning and Student Advisement. Most newcomers to the game associate advancement with effective teaching. The fast-learning novice

Cont'd on p.20

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Research and Development in Canada

a Special Report

Canadian Science Policy: a glimmer of recognition from the nation's capital?

by John Kucharczyk

In July 1977, at its federal convention in Winnipeg, the New Democratic Party passed resolutions calling for:
1. "increased financial support for basic and applied research and development to a level of at least 2.5% of the Gross National Product within three years. This would cover
a) basic research (curiosity-motivated), at least 0.4% of G.N.P., to be administered by a single granting agency to support programmes carried out in Canadian universities and research institutes;
b) a requirement for industrial R & D to be carried out in Canada by domestic and foreign-owned companies operating in Canada;
c) establishment of R & D Crown Corporations, in co-operation with the provinces, each with a mandate to carry out mission-oriented research on problems of national need such as the environment, urban development, northern development, etc.
2. "Technology transfer to secondary industry to be promoted by planned interaction between R & D Corporations, universities and industry;
3. "Financial assistance by government for commercial technological development to be on the basis of equity in the venture;
4. "...sufficient flexibility in the programmes to permit concentrated attacks on perceived problems facing society, e.g. alternate energy sources."

* * * *

On March 7, 1978, at the beginning of a 5½ hour R & D debate in the House of Commons, Progressive Conservative Leader Joe Clark moved a motion that Canada:
1. "Set a goal of 2.5% of the G.N.P. to be spent on R & D by 1985;
2. "significantly increase the research and development tax credit for Canadian industry;
3. "give particular priority to strenghtening our R & D programs, particularly in the fields of agriculture and renewable resources;
4. "extend the tax credit system to provide incentive for new employment in industrial research, design and development;
5. "encourage development work in areas of acknowledged Canadian expertise."

* * * *

On March 18-19, the Social Credit Party of Canada unanimously adopted a resolution to establish a science policy in accordance with three fundamental principles:
1. "The need for an adequate budget with the increase in R & D expenditures at 2.5% of the G.N.P. by 1985, of which 50% will come from the private sector and 50% from the public sector;
2. "The urgency of establishing a long-term Canadian scientific policy (3 to 9 years) supported by budget engagements of three (3) years revised annually, and also longer projections of less precise nature, as stabilizations measures;
3. "The presence of representatives chosen by the scientific community on government organizations and committees, disposing of budgets, determining priorities, and consulted while realization of long-term policies and also for the establishment of future projections once these policies are established."

* * * *

On April 10, in his first budget, Jean Chrétien announced that companies increasing their R & D spending from their average level for the latest three years will be allowed to write off 50% of the increase under a new ten-year incentive. The previous day, Judd Buchanan, the Minister of State for Science and Technology, announced a $5 million works program to employ Canadian engineers and technicians in industry.

* * * *

So for the first time in at least ten years, Canada's federal politicians are talking about science funding and policy — and there are some signs that Canadian R & D may develop into an important issue because of its relationship to our current economic predicament.

Canada way behind

Individually, and collectively, these policy proposals and measures represent a substantial improvement on the existing situation, which is appaling. As shown in Table 1, Canada not only invests less on R & D than any other western industrialized nation, but has fallen in the past decade to a level 80% of that of Italy.

TABLE 1
Gross Expenditures on R & D As % of G.N.P.

	1965	1975
U.S.A.	2.9	2.3
U.K.	2.6	2.5
WEST GERMANY	1.6	2.4
NETHERLANDS	2.1	2.0
JAPAN	1.5	1.8
SWEDEN	1.3	1.6
FRANCE	2.0	1.5
ITALY	—	1.1
O.E.C.D. selected average*	1.6	1.6
CANADA	1.1	0.9

*includes Austria, Belgium, Finland, France., W. Germany, Japan, Italy, Netherlands, Norway, Sweden, U.K., and U.S.A.

It is clear that the major responsibility for our failure to invest in R & D must be borne by the current Government of Canada, whose central role in making R & D expenditures in the public sector and encouraging R & D by private industry, is the major steering force.

Between 1968-69 and 1975-76, the priority attached to R & D by the Liberal Government in Ottawa is revealed in that R & D expenditures fall from 5% of federal expenditures to 2.4%, and all federal expenditure on all aspects of R & D (intramural and extramural) remained unchanged (in constant dollars) while there was substantial and real growth in population and G.N.P. Consequently, by early 1976 the actual federal expenditure on R & D had fallen to less than 0.5% of the G.N.P. Of this, 0.5% spent by the federal government, only 0.1% found its way to university research and only 0.1% to industrial research, the two most productive areas for such expenditures. Under these conditions of continuous governement neglect of science, the goal of 2.5% of the G.N.P. targeted for Canadian R & D by the Lamontagne Senate Special Committee on Science Policy will never be met. 0.1% of the G.N.P. spent by the federal government on industrial R & D cannot be expected to foster 10-15 times this amount from the private sector, and the 0.1% of G.N.P. spent on university research cannot match the approximately 0.25% of G.N.P. that other developed countries allocate to university research.

What is to be done?

How cogent a claim can be made for more Canadian R & D in a time of strenuous competition for federal dollars — a time when federal cutbacks in spending have come to be a keynote conceptualization of political and economic policy? Increasingly this question is being asked of the research community by individual Members of Parliament and others concerned by the long-standing lethargy shown by the Liberal government in its policies in support of R & D.

The answer is straightforwardly deductible: Canada has higher labour costs, a worse climate and more difficult transportation problems than most of our industrial competitors. We can only compete if we have a technological or conceptual advantage, and these derive principally from R & D and secondarily from the bold use of R & D. We must therefore invest in this area at a rate at least comparable to the group of nations near the top of the list in Table 1.

That more Canadian R & D would be a step in the right direction derives support from a variety of data. For example, at the recent R & D conference sponsored by the **Financial Post**, Thomas Vanderslice, a senior Vice-

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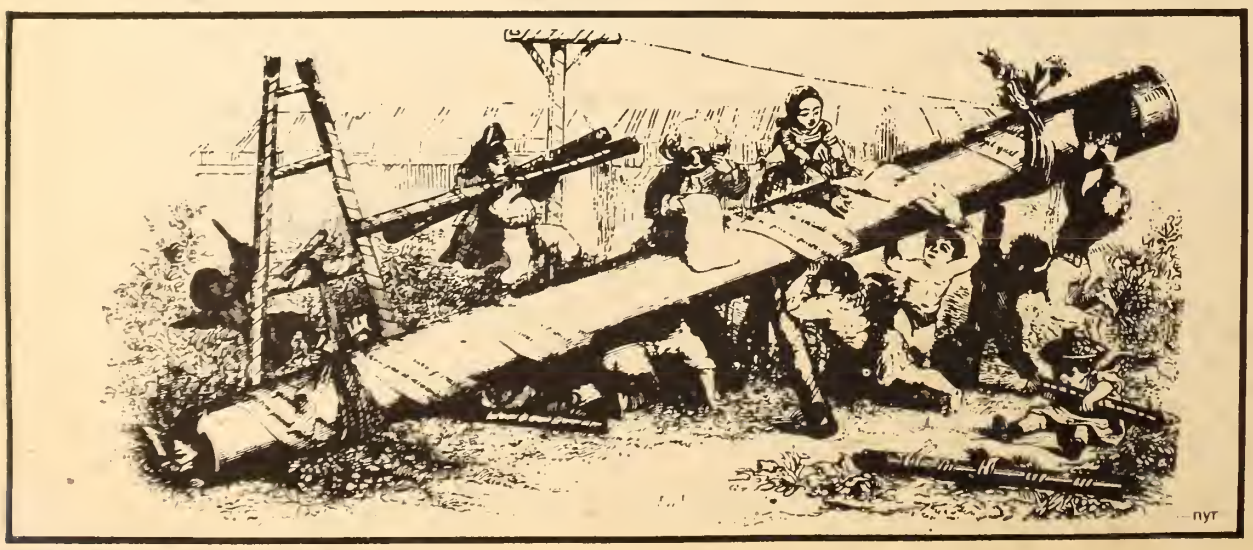

SCIENCE POLICY...

President of General Electric, reported several salient observations - based on a 25 year study of the link between the technological status of United States industries and their economic performance:

☐ High technology industries grew three times as fast as low technology industries;

☐ Output per employee was twice as high in high technology industries;

☐ High technology industries were much more resistant to inflation;

☐ Employment in high technology industries grew nine times faster than in low technology industries; and,

☐ The products of high technology industrial effort accumulated a trade surplus of $25 billion whereas with low technology industries a $16 billion deficit from the break-even point in 1969 has accrued.

In every industrialized country where the standard of living is high, there is a very successful, very aggressive, and very efficient manufacturing sector — in every country, that is, except Canada. In 1975, among the fourteen O.E.C.D. member nations, Canada had the second lowest percentage of workers in the manufacturing area — 23%. Only Ireland at 20% was lower. In contrast, the percentage in West Germany was 38, in the U.K. 36, and in the U.S.A. 34% of the working force was engaged in manufacturing.

The Electrical and Electronic Manufacturers Association of Canada has pointed out that alternatives to stimulating R & D growth in Canada are not viable:

"An economy based on agriculture and natural resources will not support growth of Canadian employment. Neither will it provide jobs for university graduates in science and technology. Our sector of industry has already proven that for every million dollars of industrial R & D investment there was a pull-through of close to 100 new jobs created. This is well recognized by underdeveloped countries who seek to raise their level of technology, often with Canadian help."

The effect on the Canadian economy of not promoting growth in indigenous R & D is predictable. Given that Canada has the highest degree of foreign ownership and control of its industry among O.E.C.D. member countries and that most of these multinational companies do the great proportion of R & D work at the head office, Canada's "branch-plant economy" is rapidly deteriorating into a "warehouse economy". Our continued exclusive reliance on capital-intensive, resource-extractive industries yields to a huge trade deficit ($11 billion in 1977) and high unemployment (resource-extractive industries generally do little R & D and consequently are not labour-intensive).

Ottawa's role

The federal government's contribution to this vital area of our national enterprise has been meager. This was pointed out by the Royal Society of Canada in its brief to the Prime Minister in 1976:

"Although it was generally recognized that government support of industrial R & D was far too small in 1969, and although a substantial improvement was made in 1970, by 1975 it had decreased, when considered as a fraction of the G.N.P., to as little as 87 per cent of that in 1969; in terms of the fraction of federal budgetary expenditures it had fallen to 68 per cent. To make matters worse, the Department of Industry, Trade and Commerce has abolished its IRDIA program (for which 1974-75 expenditures were $32 million) and has cut back its PAIT program. These programs are of vital importance to high-technology industries and these actions will seriously hamper the attempts of these industries to improve their foreign markets and increase their productivity".

The same haphazard, lackadaisical approach to science is reflected in the Government of Canada's failure to support research work administered to by the granting councils. During the five-year period 1969-74 average NRC grants (operating plus equipment) declined from $9,129 in 1969 to $8,908 in 1974. A 34% reduction in the purchasing power of the NRC grants dollar was seen within the short span of five years. Then came the 1975 freeze on funding of research; this year's miserly increases in the MRC and NRC budgets will further exacerbate an already desperate situation.

During 1969-74, five other industrial nations all showed substantial increases from their 1969 level of funding for university research. These increases ranged from a low of 48% for the U.S.A. to a high of 156% for West Germany. As Harold Harvey of the University of Toronto has pointed out: ... "there is no universal pattern of reduced university support; what has happened in Canada is uniquely Canadian."

Both the Minister of State for Science and Technology, Judd Buchanan, and his Parliamentary Secretary, Frank Maine, point the finger of blame for our R & D predicament at the universities and at industry, who they say have remained aloof from the country's social and economic realities.

Dr. Maine recently told a University of Western Ontario graduate student audience that there must be a change in attitudes of university administrators and researchers towards applied research. He urged scientists to develop "entrepreneurial activities" and to turn more to science aimed at problem solving instead of... "concentrating largely on the advancement of their disciplines through basic research".

Mr. Buchanan stated in the House of Commons on March 7 that... "the bulk of R & D financing required by Canada must come from the private sector and not the government..." and so echoed the proclamation by the Minister of Finance that the demise of Canadian R & D is due exclusively to inaction in the industrial sector.

Government abdicates — leadership

For reasons already stated, this sort of abdication of its leadership responsibilities by the Government of Canada will prove ruinous. Foreign-owned and controlled industries operating in this country will continue doing R & D at the locus of the parent because to behave otherwise would prove cost-ineffective. Canadian industries, potentially R & D active, cannot fundamentally change their non-entrepreneurial character without effecting a system to mobilize all of the relevant expertise already present in government, university and industrial laboratories. And it is here that the self-serving view espoused by the federal government is most clearly underscored: more industrial R & D, though it is desperately needed, cannot be the cure-all if at the same time university and government laboratories are allowed to fall apart for lack of money. Effective transfer of technology and existing knowledge between the sectors is required, and this will not be realized by merely reapportioning the meagre sums currently given by the federal government to R & D. As John Shepherd of the Science Council of Canada has pointed out, it will do us no good to try and simply average starvation. T.C. Clark in a recent report to the University of Toronto reaches the same conclusion:

"There is no evidence that Canada overspends on university research. ....Wilful neglect of university funding does not improve the main R & D problem; it merely destroys the future prospects for its improvement."

In the May 1978 issue of University Affairs, Dr. Clark further points out that while university research complements industrial R & D, its conduct and management differ widely, and he suggests that this should be recognized by those who clamor for exclusively more industrial R & D:

"Business, government and university teaching are all good on quantity control, but weak in quality control. University research is weak on quantity control and strong on quality control. This is assured by external review groups of arm's length but well qualified 'peers' who in many cases determine whether a program is good enough to continue or not.

"The management responsibility is highly devolved with little or no intermediate supervision... University research... is broadly useful rather than specifically useful — the ongoing activity illuminating more specific development elsewhere. ...It is a general support bed from which specific new possibilities and choices pop out from time to time.

"Largely as a consequence of the above special features of university research, it is clearly relatively cheap despite detailed costing ambiguities. Efforts to make university research style and procedures more comparable with those of industrial research will make the cost more comparable; that is, the cost will increase, or, more likely, less research will be done with the available funds."

It is instructive to note that President Carter, in presenting his budget proposal for 1979 to the U.S. Congress, stressed that science policy be viewed in terms of a convergence with economic growth policy, and argued that Congress should not look at research allocations as expenditures but rather as a long-term investment with a guaranteed high rate of return.

Mr. Carter's optimism is well-founded. In terms of job creation and in creating a more favourable balance-of-trade with our international competitors, investing in R & D is a proven good business proposition. It is generally true, for example, that for the federal government to give a researcher, whose salary is already guranteed by a university, $20,000, is tantamount to creating approximately 1.2 productive jobs. This figure is based on the hiring of one technician or research assistant, together with the job potential created by the purchasing of scientific materials from the manufacturing industry who supplies the laboratory or library concerned. This alternative is surely preferable to welfare and the much more costly and often aimless job creation schemes now so much in vogue.

The March 7 debate in the House of Commons has placed the "R & D and the economy" question squarely into the political arena. Given the unanimity of opposition viewpoint here, the government party, intransigent as it has been to lobbying by the research community for more direct federal funding of research, may now be forced to defend its policies before the proper arbiter for such disputes — the electorate. Particularly, in the 49 electoral districts containing universities or colleges, this should prove an interesting exercise indeed.

John Kucharczyk is Executive Secretary for Science Policy, Canadian Federation of Biological Societies.

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Canada's Scientific Community

Out of the wilderness, into the political arena

"...not only will men of science have to grapple with the sciences that deal with man, but... and this is a far more difficult matter... they will have to persuade the world to listen to what they have discovered. If they cannot succeed in this difficult enterprise, man will destroy himself by his halfway cleverness." *A warning issued to scientists more than half a century ago by Bertrand Russell.*

by John Kucharczyk

Following meetings with M.P.s in early 1976, organized jointly by the Canadian Association of University Teachers (CAUT) and the Canadian Federation of Biological Societies (CFBS), the Science Policy Committee of the CFBS decided that a new approach to federal lobbying was required to break the catastrophic trend underscored by the freeze on research funding of December 1975. The new effort would require:

(i) as broad a representation as possible.

(ii) clearly articulated common requests, both financial and in policy, officially endorsed by as many research organizations as possible.

(iii) central recording and analysis of detailed reports from all meetings with M.P.S. and government officials and.

(iv) extensive press coverage and a commitment to full disclosure to the press of ongoing developments and of any assurances received.

Beginning in late September of 1976, meetings of CFBS personnel with various individual M.P.s began to take place at a rate of one or two per week. Concurrently, planning was started for an early December lobby on

(a) restoration of funding to 1969-1970 levels,

(b) a science policy including long-range funding predictions and

(c) a system to allow for routine consultation by government with the research community on science policy matters.

The CFBS invitation to participate in the lobby was accepted by the Canadian Society for Clinical Investigation (CSCI), the Canadian Association of Physicists (CAP), the Chemical Institute of Canada (CIC), the CAUT, the Humanities and Social Sciences Research Council (HSSRC), the Scientific Engineering and Technological Community of Canada (SCITEC) and the Canadian Physiological Society (CPS).

On December 7 and December 8, 1976, researchers, usually in groups of two or three, met with fifty individual M.P.s from the Liberal, Progressive Conservative, New Democratic and Social Credit Parties for from 30 minutes to one and one-half hours in the M.P.s' offices on Parliament Hill. Other M.P.s met lobbyists more briefly at two small receptions held during the evenings. Researchers used a CFBS-prepared policy statement and other material, and filed detailed written reports with the Chairman of the Science Policy Committee of the CFBS.

A few days before the lobby the Government introduced in the House the long-postponed Bill C-26, which ordered a restructuring of the three granting councils. Immediately before and again during the lobby, CFBS Science Policy Committee members met with the then Minister of State for Science and Technology at his invitation, and were urged by Mr. Faulkner to support the Bill. During the lobby, many M.P.s sought briefings from the researchers on the Bill.

In the days which followed, much discussion of the research community's concerns occurred in the House, including a day of debate (December 13) on Bill C-26 at which time M.P.s debated key financial and planning issues, as well as tariff regulations which had increased the cost of certain types of university research. These tariff restrictions were subsequently lifted.

The February 1977 announcement that the freeze on research was ended and that each of the granting councils would receive 11½ - 13% budget increases in 1977-78 was the first clear sign that progress in lobbying was being made. Moreover, some M.P.s indicated that the pressure on the government should be kept up. Thus in mid-March of 1977 the Chairman of the Science Policy Committee of the CFBS wrote to all Members of the House stressing the need for government to work towards long-range financing and planning of research, and planning for a new round of meetings in April.

On April 27 and 28, 1977, the same research organizations which lobbied the government the previous December were joined by the Canadian Geoscience Council (CGC) and the Biological Council of Canada (BCC) in an even broader-based CFBS-sponsored lobby concentrating on long-range issues. Forty M.P.s, as well as some senior civil servants, met with the 38 researchers. All representatives of the invited research organizations again distributed a CFBS-prepared general statement to M.P.s and filed reports on their meetings with the Chairman of the Science Policy Committee of the CFBS.

Five days before the April meetings Bill C-26 received second reading in the House. It proceeded thence to the Miscellaneous Estimates Committee of the House where the research community presented its views through the testimony of Dr. Neil Madsen, then Vice-President and currently President of the CFBS. Researchers' concerns about changes in mandates of the granting councils, about money, about specifications of ministers for each council, about the Secretary of the Ministry of State for Science and Technology chairing the Inter-Council Coordinating Committee, and other points, were aired at this time. Bill C-26 was passed in the House on 3 June, 1977, and received Royal Assent on 29 June, 1977.

During the four days of lobbying, researchers raised three key concerns of the research community: the need for having three-year, annually-updated estimates, indexing, or some other reasonable long-term plan on federal funding of research; the need for a further restoration of funding to 1969-1970 levels; the need for a comprehensive and truly national science policy which would specify clearly the methods by which the government and the research community will routinely consult on matters of mutual interest. Researchers completed an "Interview Reporting Form" for each M.P. which, in addition to noting the M.P.s' comments on each of the three major lobbying points, allowed the interviewer to score the M.P. on a variety of attitudinal and other positions.

Results

Taken from scores reported in a total of 88 "Interview Reporting Forms", the interviewers' perceptions of the "Level of comprehension of research and research problems by the M.P. (s)" suggest that the majority of Canadian parliamentarians have at least some knowledge of the prevailing research situation. Scored on a "comprehension scale" which ranged from "Major misconceptions" at the low end, through "NIL", "POOR", "FAIR", "GOOD", to "EXCELLENT" at the upper end, ten out of 68 M.P.s rated were given a score of "EXCELLENT", 22 a rating of "GOOD", 26 a rating of "FAIR", 7 a rating of "POOR", and 3 others a rating of "NIL" (comprehension).

Partitioning of M.P.s by Party membership into categories of "well-informed" and "poorly-informed" was not clear-cut, although N.D.P. M.P.s were, on the average, given higher scores. On the other hand, when M.P.s whose constituency contains a university or college (7 Liberal M.P.s, 11 P.C. M.P.s and 2 N.D.P. M.P.s) were compared with M.P.s from non-university, non-college electoral districts, the former group tended to be rated considerably higher on the comprehension of research scale (Table I). The relationship between the former occupation of the M.P. and his or her "level of comprehension of research and research problems" is shown in Table II. *(See page 12)*

Broached on the question of using 3-year "rolling" estimates, indexing, or other long-term plans for federal funding of research, the majority of M.P.s indicated that they were in favour of the idea. Of the 70 M.P.s interviewed during the two lobbies, 23 said or implied that they would "actively support us" and 27 M.P.s implied that they "passively support us". Eleven M.P.s were judged by the interviewers to be "mildly sympathetic" to long-term funding schemes, six M.P.s were scored as being "neutral" on the issue, and one Liberal M.P. could not be determined from a reading of his "Interview Reporting Form".

As a percentage of the total number of M.P.s interviewed on this question from each of the federal political parties, N.D.P. M.P.s and P.C. M.P.s were scored as being more supportive of the proposal than were the Liberal M.P.s: 75% of the twelve N.D.P. M.P.s were scored as "will actively support us" or "will passively support us" and 84% of the 32 P.C. M.P.s were scored in one of the two categories. Only 53% (14 out of 26) of the Liberal M.P.s were scored as being supportive of the idea of a long-term plan on federal funding of research.

Most of the M.P.s interviewed seemed to be in favour of having "Government routinely consult with the research community on many (research) matters, including priorities". Twenty-five M.P.s were considered by the interviewers to "actively" support this proposal. Another 25 M.P.s were regarded as "passively" supporting a system calling for routine consultation. Thirteen M.P.s were only "mildly sympathetic" to the idea of government meeting at regular intervals with the research community. One Liberal M.P. was "neutral" in this proposal, and the stance of 6 other M.P.s could not be assigned to any of the categories listed on the "Interview Reporting Form" for various reasons.

Of the M.P.s interviewed in both lobbies, the P.C. and N.D.P. members of the House showed a stronger inclination towards having routine consultation with the research community than did Liberal M.P.s. Twenty-four out of 32 (75%) P.C. M.P.s were reported to be either "actively" supportive or "passively" supportive of the proposal as were 9 out of 12 (75%) P.C. M.P.s were reported to be either "actively" supportive or "passively" supportive of the proposal as were 9 out of 12 (75%) N.D.P. M.P.s. In contrast, only 17 out of 27 (63%) Liberal M.P.s were scored in either of these two 'support' categories. Two out of the four Cabinet Ministers interviewed were in favour of having routine consultation; the other two were "mildly sympathetic" to the proposal. (The Ministers currently heading National Health and Welfare and the Ministry of State for Science and Technology did not accept the invitation to participate in either lobby). The stance of six M.P.s on this question could not be determined from a reading of the "Interview Reporting Forms".

M.P.s were (surprisingly) in agreement that there should be further restoration of funding of research (to 1969-1970 levels). Twenty-two out of the 70 (31%) M.P.s were scored as "will actively support us". Another 25 M.P.s were considered as "passively" supporting further restoration of funding. Twelve M.P.s were "mildly sympathetic" to the proposal. Five M.P.s were judged as being "neutral" on this issue and two M.P.s were considered "unsympathetic".

Based on the available data, the Liberals appeared to be the stingiest of the three political parties (but are of course in government). Only 14 out of 26 (53%) Liberal M.P.s indicated that they would "actively" or "passively" support restoration of funding, whereas 9 out of 12 (75%) N.D.P. M.P.s and 24 out of 32 (75%) P.C. M.P.s were scored in the two categories.

With regard to the lobbyists' proposal that Canada needs a comprehensive science policy, the majority of M.P.s were in agreement. Twenty-eight out of the 70 (40%) M.P.s indicated that they would "actively" support the proposal; another 21 (30%) M.P.s were listed as "passively supports us". Twelve M.P.s were "mildly sympathetic" to the national science policy proposal; four M.P.s were considered "neutral". The stance of four M.P.s on this issue could not be determined.

Seventy-eight percent of P.C. M.P.s and 83% of N.D.P. M.P.s were in favour of having a national science policy whereas only 54% of the Liberal M.P.s interviewed supported the proposal.

Many M.P.'s were generous in giving advice "on promoting our issues".

"Keep up the pressure on government and publicize" registered as a recurrent theme in the M.P.'s advice-giving ledger. "Academics are politically naïve ..." and "...they need

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The major part of this Special Report was prepared, written and researched by John Kucharczyk, Executive Secretary for Science Policy. Canadian Federation of Biological Societies.

publicity", said one M.P. Another M.P. offerred that "... scientists must sell their research (to the public) and have no intrinsic right to research funds except in a limited cultural sense". A P.C. backbencher felt that "...researchers should actively volunteer their expertise to M.P.'s ... to let themselves be known and available...". "We should seek out increased attention of the media ..." and the "...various scientific interests should become unified — science should do a better job of healing itself", suggested a P.C. backbencher. A Liberal M.P. echoed this sentiment. Our success in lobbying, he pointed out, will depend at least in part on the research community being able to" ... speak with one voice", since "...M.P.'s require a consensus on what constitutes adequate funding". "M.P.'s", he added, "do not wish to consult with representatives of different disciplines who speak for their own petty concerns instead of on behalf of all Canadian research".

A Cabinet Minister told his interviewers: "Keep up public relations and publicity aspects as this creates public pressure and aides the Minister in focusing on his objectives". A former Cabinet Minister interviewed in April, 1977 said that he was "...glad to see us when there is not a current crisis". "Continue the lobbying because personal contact is an invaluable introduction without which mailed material slides off my desk into the basket", cautioned a P.C. M.P.

Some M.P.'s had somewhat more specific views on what constitutes an erstwhile lobbying effort. "Representatives of the research community meeting with M.P.'s is worthwhile because it gives training about useful tactics in dealing with government", volunteered an NDP M.P. "But more importantly", he continued, "researchers should keep up pressure on the Cabinet and Liberal Caucus through members of their electoral ridings", and (also we should)... "keep in close touch with the provincial governments regarding postsecondary education."

A first-term Liberal M.P. told the interviewers that the research community must "provide a rational basis for indexing (of federal support for research commensurate with the level of inflation)" by "...clearly articulating our arguments for increased funding being justified at a time of financial restraint". When it was pointed out to a Cabinet Minister during the December 1976 lobby that the peer-review system is cannibalistic in circumstances where research funds are inadequate to support properly even Canada's best scientists, the Minister retorted that this still did not excuse the research community from having to "...justify the need for increased financial support on the basis of R & D needs in industry to promote our issues".

This view of how federal funding of Canadian science should be accomplished — that "cost-effectiveness" and "cost-accountability" of any research effort decides it's worthiness — was held by a significant number of the M.P.'s interviewed. One lobbyist offered a personal explanation for the prevalence of this attitude amongst our parliamentarians: "Many M.P.'s are self-made business men and fairly successful", he wrote on his Interview Reporting From. "They are practical and results oriented. They are cast of the hard-nosed, fiscal-responsibility, political-expediency mold, and for them our problems are not automatically of concern. They should be sent as many memos and statements as possible since they are more likely to be provoked into acting by a quantitative input than by a qualitative one."

What can the Canadian research community do?

Whether or not M.P.s who view science solely as a short-term business venture can be dissuaded from this brazen myopia and redirected towards objective assessment of "Science in Society" — the Bertrand Russell vision — is a moot point. More important for now is that the Canadian research community not lose its battle for a proper national science policy by default, by retreating only to proselytize the ivory-tower "science only for the sake of science" ethic for which there are no listeners in government.

To reaffirm, maintain and strengthen our commitment to Canadian research, we must recognize that now, in 1978, and probably for some years to come, we are a special-interest group before the eyes of our would-be benefactors in government. We are competing for a share of the same pool of federal dollars and for the same governmental attention devoted to legislation formulation, as are many other special-interest groups. Our wounded egos notwithstanding, this is clearly a sign of the times. Our elected representatives in government have told us at least this much.

To recognize that before the present Government of Canada the research community constitutes above all else a special-interest group, is the antecedent condition. We must then *act* accordingly. Lobbying of government on behalf of science must be continued in earnest and cannot be done amateurishly or sporadically, as in waiting for another 1975-like freeze on research funding.

Much of the fabric of Canadian federal support to science (miniscule that this support is) is intertwined with a rational that research must be useful for the solution of practical problems if it is to be competitive in the dogfight over tax dollars.

Can we, in at least some instances, lobby for science in terms of the "cost-effectiveness" of Canadian research by providing more of the dollars-and-cents figures to argue that the research base is an important pillar of support for our country's economy?

Can we explain just what sort of institutional structure for science and technology will be adequate to the need — in terms of organizational and consultative capacities and mandate in terms of policy; in terms of cost?

Can we, instead of waiving the "flag of Copernicus" and saying that all scientific inquiries are likely to be equally productive, decide priorities — because it is perfectly clear from the conversations held with M.P.'s that if the research community does not indicate its priorities others perhaps less competent will decide them for us.

The fact that the Government of Canada has especially low regard for basic science should not automatically put those many of us who do fundemental research at a further disadvantage. Simply, we must seek to improve the articulation along the route from basic research to technological or other application. This should not be so difficult since, of course, there is a continuum between basic and applied, although its extent varies from one discipline to another.

To assist us in lobbying government effectively, it helps to have an organization of science policy federations whose work will be enriched through association without being subordinate to it.

There is also a need to have a loose network of experts, politically non-partizan, who could work together to provide advice on common problems for political leaders lacking a science education, and thus bridge the gap between them and the broad community they serve. One tangible achievement of the two federal lobbies may turn out to be that they encouraged the first steps in this direction.

In a recent editorial in the **International Herald Tribune**, Anthony Sampson wrote that in any meeting he can always tell the scientists from the politicians.

"Scientists", he said, "will always first react to a given statement by asking if it is really true. Politicians, on the other hand, will always ask *why* it was given."

Anthony Sampson's observations on the human professional nature have, I think, some application to the present problem.

It is not enough to tell a politician or civil servant that it will be tragic if government refuses to support research as a result of its failure to see science as an investment in long-term solutions to human problems.

If Sampson is correct, the politician will not test the veracity of the statement; rather he will wonder *why* it was made. The politician will be looking for a specific "message" — a message in terms meaningful to him.

Researchers have in the past focused their science policy activities mostly on issues that affect research funding, leaving the initiative for policy formulation to legislators and administrators whose background has led them to a public orientation. This problem is not so easy to grapple with but it is not impossible — as Melnick *et al* point out:

"The divergent views held by scientists, administrators and legislators derive from their different views of the purpose of research. Scientists have a deep sense of the internal logic of the scientific process and their understanding of progress is in terms of advances in the study of life processes. Administrators, in contrast, must justify and support their activities in terms of 'practical' results and therefore must be convinced that support for science will benefit society. Here, research is judged by the applicability of results. Finally, legislators, who live in a world where the ability to articulate a position that will build a constituency is a key skill, in general see science as one of a multitude of national activities which compete for limited supplies of tax money. For them, the case for research has to be sufficiently convincing as to withstand political testing with the electorate.

"The origin of the different point of view of scientist, administrator and politician emanates from the vastly different institutional environments within which each must work. The remedy here is not to make a stronger case for one position over the others, but rather to define the constituency of biomedical, and all other research, to include the entire public. By working to increase their area of responsibility ... biologists will increase the size of the constituency that can be called on to properly evaluate their work." (W.L. Melnick, D. Melnick and H. H. Fudenberg, **Federation Proceedings, 35: 1957-1963, 1976).**

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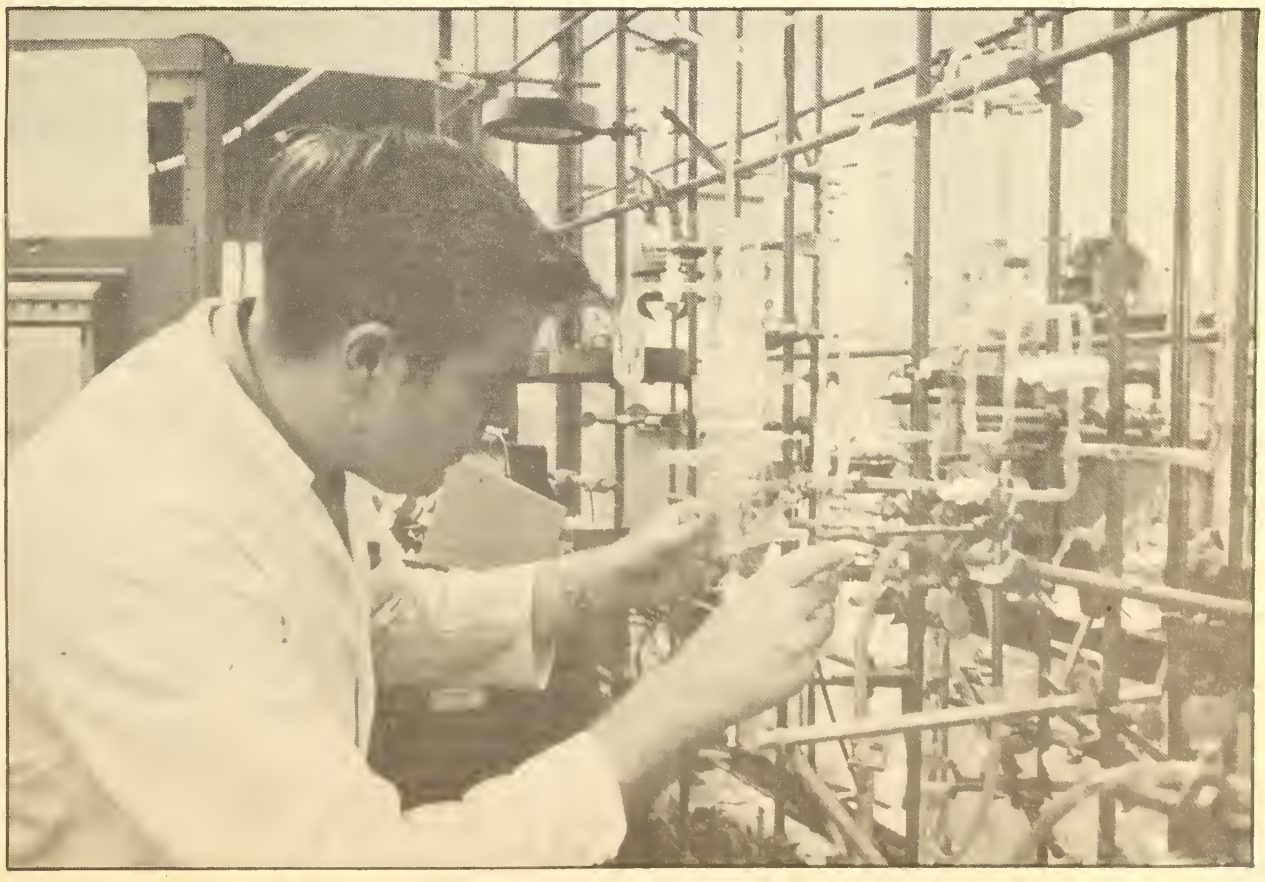


NFB Phototheque/Photo by Duncan Cameron

WILDERNESS... *from p. 11*

TABLE I

The level of comprehension of research and research problems by M.P.s whose electoral constituency contains a university or college*, for M.P.s from non-university, non-college ridings, and for all M.P.s interviewed considered together. Rating scores shown for each of the federal political parties are the averages of scores of individual M.P.s according to the scale: "EXCELLENT" + 5, "GOOD" + 4, "FAIR" + 3, "POOR" + 1, "NIL" — 0, "Major misconceptions" — 1.

	P.C.	Liberal	N.D.P.
UNIVERSITY** OR COLLEGE	3.6	3.5	3.5
NON-UNIVERSITY, NON-COLLEGE	2.4	2.6	3.0
ALL M.P.s INTERVIEWED	2.9	2.7	3.2

* 7 Liberal M.P.s, 11 P.C. M.P.s and 2 N.D.P. M.P.s, whose constituency includes a university or college, were interviewed during the December, 1976, and April, 1977, lobbies.

** There are 52 Universities or Colleges contained in 49 electoral districts represented by 22 P.C. M.P.s, 23 Liberal M.P.s 3 N.D.P.M.P.s, and 1 M.P. who sits as an Independent in the House of Commons.

Scientists would do well to try and serve as a part of the "guidance sector" of society which by anticipating the results of advances in research and its associated technology can direct these changes so as to benefit all Canadians.

Make it an issue

Liberal M.P.s interviewed in December 1976 and April 1977 made abundantly clear the position of the Government of Canada in increasing federal funding of research: "Research is a low priority because it is not a political issue; it is not a political issue because it lacks voter interest." A Liberal M.P.'s comment captures this disposition. Asked by an interviewer if the federal government could ever be expected to initiate measures towards restoring the purchasing power of the Canadian science dollar, he replied that "...politicians cannot lead the public... they can only reflect public opinion in their actions".

In thirty cases during the December 1976 and April 1977 federal lobbies, M.P.s told their interviewers that one of the most effective ways of promoting the issues of science is to get the public excited about them — that then, necessarily, science funding and science policy would become also an issue in government circles. Until this happens, the M.P.s pointed out, science will remain a secondary concern of government.

The curious thing here is that while governments perceive that the public is generally "anti-science" or at least not interested in science, the evidence of recent public opinion polls undertaken in the United States and nine European countries show, to the contrary, that public attitudes towards science are highly favourable.

Surveys conducted by Opinion Research Corporation in 1972, 1974 and 1976, and reported in the magazine Science (Vol. 199), indicate that 71% of the general populace considers that science and technology have changed life for the better while only 7% consider the change to have been for the worse.

In cases where science and technology are deemed to have caused problems, the public draws distinctions in imputing blame. Reports Science: ... "Sixty percent say that government decision-makers are most at fault, 14 percent point the finger at business. Only 5 percent blame scientists directly, and 7 percent blame technologists and engineers." Very similar results were obtained by the Commission of European Communities and reported in Science: "Sixty-nine percent of people in nine European countries consider science to be 'one of the most important factors in the improvement of our daily life'.

"The main surprise — and this must be stressed — no doubt lies in the extremely strong and widespread consensus in favour of science," note the Commission's reporters. "There is no crisis of confidence in science among the general public of Europe."

In important respects the situation is quite different in our country. In Canada, there is by no means enough reporting of science news in the Canadian press or on radio or television. At the present rate of reporting the public will never get excited about science.

A media study on science communication commissioned by the Ministry of State for Science and Technology, (Dubas, O. and L. Martel - 1975. **Media Impact Vol. 2; A research Study on Science Communication**, Ministry of State for Science and Technology, Information Canada, Ottawa.) as well as several smaller-scale investigations, has shown conclusively that the public is hungry for more science news. The MOSST - commissioned survey of 2000 randomly-selected Canadians found that more than 80% of the population over age fifteen believe it important to be kept informed about science. Four out of the public's top five interest areas are science-related, and these four rate considerably higher than sports or society page features.

Despite the public's expressed interest in having more news on science, two-third's of the respondents in the MOSST survey could not name even one Canadian scientist and reported also that they were unsuccessful in gaining any sort of specific knowledge about Canadian achievements in science.

Editors and writers are key links in the chain of science reporting. Whereas the editor decides the priority of science news in relation to other topics, the writer must make the story understandable for the audience and, at the same time, satisfy scientists. To a large extent, both the newsworthiness of a science story and its accuracy is contingent upon the nature of the reporter's source of information, which in turn is only as good as it's availability. And it is here that the MOSST study was able to identify a weak link in the chain of science reporting. "Scientists", the survey concluded, are "...distrustful of the media and reluctant to discuss in public the implications of their work".

* * * * *

So, science publicization and popularization — the prerequisite to government attention in the area — is not being accomplished nearly as well as it should. On the one hand there is an expressed desire by a large majority of the Canadian public for more science news and science features. At the same time, the proper sources of science information — the scientists — are seen to be unwilling to communicate with the public.

The procession of this cycle must be broken. And the responsibility for doing this lies with the research community not with the government; not with the public or press.

At least four proposals can be made towards increasing publicization and popularization of Canadian science:

First: more "open houses", and "academic festivals", and "community meetings" should be organized at our research institutions and universities. To these should be invited the lay public, the local press, and the local municipal, provincial and federal representatives of government.

Second: university departmental seminar coordinators should routinely invite local science writers to attend scientific sessions. In addition, departmental chairmen should provoke particularly reticent faculty members to periodically write a story based on their research findings and to submit this for publication to local newspapers and magasines. I see no reason why scientific journals should always enjoy first-hand a monopoly on serious science news.

Third: the research community should encourage and support the Canadian Science Writers Association, and as well any individual writers who we find are doing particularly commendable work, by telephoning, by writing, and by inviting them for interviews.

Finally: the learned societies and Canadian research organizations should invite science writers to attend their scientific symposia and science policy sessions, and whenever possible, to circulate in advance the texts, or at least the abstracts to the media.

The consciousness of mutual interests — scientific interests, public interests and government interests — carries with it a degree of reciprocal responsibility:

"The problem for governments that are economizing or pretending to economize, is that there's no strong political rationale for loosening up on research money. And government decisions are necessarily political.

"Researchers are worried about their grants but the public isn't. Or, if it is, it's not letting the politicians know. If there is a public clamor for more spending on science, government will have to come across or risk reprisals at the polls. At the moment, there's no sign of any such risk.

"Scientific research in general has a good reputation but a very vague one. People know it has conquered countless diseases, produced drugs that save and prolong life, and given birth to economic wealth and personal conveniences beyond measure.

"But the citizen doesn't have the information to intelligently relate that mysterious activity - research - to the tax dollar...

"Like every other activity in the competition for limited supplies of tax money, research has to make a convincing case that will stand up to political testing.

"If Canadians are convinced that research needs more money, the politicians won't be stingy. Right now, however, people just don't have the information on which to make a responsible judgment". (From the editorial page of **The Hamilton Spectator**, January 23, 1978)

TABLE II

The level of comprehension of research and research problems of M.P.s interviewed at the December, 1976, and April, 1977, lobbies according to former occupation. Scores shown are in each case averages of individual scores determined by the formula given in Table I.

Former Occupation of M.P.	Number of M.P.s interviewed	Comprehension score
Engineer-Technologist	2	4.4
Farmer	8	4.0
Career public servant	8	3.6
Teacher	7	3.6
Health care (physician, veterinarian, pharmacist, chiropractor)	10	3.6
Lawyer	18	2.7
Businessman	11	1.6
Other (Economist, Chartered Accountant, Administrator, Worker)	6	3.3
Unknown	3	2.7

* As listed in "Preliminary Report of the Chief Electoral Officer, Thirtieth General Election 1974".

EDITOR - INFORMATION OFFICER

The Canadian Association of University Teachers requires an Editor-Information Officer for its Cemtral Office in Ottawa.

The successful candidate should have the following qualifications: experience in journalism, editing and public relations; knowledge of printing and publication procedures; academic background. Bilingualism will be an asset, but is not a requirement.

Duties will include editing a magazine, information and public relations activities.
Salary for this position is negotiable.

This is a limited term appointment to replace the editor on a sabbatical leave.

Candidates should submit applications with curriculum vitae and references to:
Executive Secretary, The Canadian Association of University Teachers, 75 Albert Street, Suite 1001, Ottawa, Ont. K1P 5E7.

The challenge facing the new social sciences and humanities research council

by David Steedman

April 1, 1978 may suggest nothing more than April fools' day to some, but to many academics it heralded a new chapter in the life of the humanities in Canada. For this is the date on which the new Social Sciences and Humanities Research Council came into being.

The birth of this new federal agency was warmly welcomed by Canadian humanists because if there's one group in Canada which is politically vulnerable and isolated it's this one.

Our unenviable position can be ascribed to several factors, not the least of which is the offhand way various levels of government, their agencies and advisory bodies treat the academic study of the humanities. The Canada Council, for example, shied away from advising the federal government of those aspects of national science policy or in-house research which have far-reaching implications for scholarly work in the humanities and social sciences. It also downgraded the role of public advocate for the humanities. At the present time the only government agency, apart from the National Library, which conducts research in the humanities and interprets its results to the general public is the National Museums Corporation.

To further aggravate matters, government departments and agencies responsible for science have little awareness of the need for humanistic scholarship. A case in point is the Science Council of Canada which specifically excludes the humanities but not the social sciences from its purview. Another example is the Ministry of State for Science and Technology which until very recently had no one on its staff to analyze research policy in the humanities and social sciences.

Government neglect of the humanities could be offset by developments in the private sector but it isn't. With one or two notable exceptions such as the Donner Foundation, private interests have shown little interest in giving funds to academic research programmes, contenting themselves with making contributions to university fund-raising drives which collect monies for library acquisitions, scholarships and endowed chairs.

Most of the blame for our plight, though, should be laid at the door of the Canadian academic community itself because it has failed to grapple with those policy issues which need national solutions — whether it be in the humanities or other areas — and to address itself to those questions outlined in the documents on research policy which have appeared since the publication of the Massey Report in 1951.

Given these circumstances the new council will have a disproportionately large role to play in not only distributing grants but also in formulating policy and serving as a forum for the discussion of issues. To help it realize these goals we humanists must be prepared to articulate constructive and realistic proposals for the national support of all facets of "research" in the humanities.

As for the council itself it must first of all ensure that the federal government and its various advisory agencies in the sciences abandon their traditional policy of neglecting the humanities. It should also assign top priority to interpreting the results of humanistic scholarship to government and the public at large. It could begin, for example, by examining National Research Council publications as well as the many publications of the National Endowment for the Humanities and then perhaps collaborate with the Canadian Broadcasting Corporation and the National Museums Corporation in the production of their publications. At any rate, it should certainly establish its own magazine to advertise the scholarly achievements of Canadian humanists and social scientists.

The new council should also define "research" or "scholarship" and decide if the close relationship that exists between research and teaching justifies new programmes that foster the professional development of teachers of the humanities and social sciences at the post-secondary (including the community college) level.

In fact, as the principal distributor of grants the new agency should review all the programmes of its predecessor. To do this it would be well advised to create a full-time analysis and evaluation division which can work with outside advisors when necessary. The present method of assessing programmes is just too dependent on the goodwill of volunteer academics and hence too slow.

As a first step certain basic information should be collected and made available to the programme directors, the evaluation division and senior management. Programmes could then be evaluated to determine their degree of effectiveness and conclusions reached as to whether the distribution pattern of grants is channelling funds equitably among different groups of academics. General "excellence" is a laudable goal, but it can results in gaps and duplication of research.

As a new body the Social Sciences and Humanities Research Council should be prepared, if conditions warrant it, to move in new directions. And here a persuasive argument can be made for defining and adopting a "policy" for humanistic scholarship. If this is done programmes can be devised for and separate funds can be allocated to areas designated for support.

Before programmes can be launched, however, the fields themselves must be surveyed, a step which in most national bodies is carried out by committees. Admittedly, the size of our country, the existence of two official languages and the isolation of our scholars would make such an undertaking extremely difficult. But it must be carried out if conclusions are to be reached

Cont'd on p.19

On the level of funding of research in the universities

by W.F. Hitschfeld

This is a contribution to the question some federal ministers and officials have been pondering for some time: how much funding should be made available for research in universities? The ideal answer is of course that funds are required to (1) allow all necessary work to be done, and (2) to permit all good and forward-looking research to be accomplished.

The answer to the first of these requirements is not easy, but there is no way around it: government in conversation with the research community can establish what needs to be done to help resolve the priority needs of society which the government recognizes, and they must shop around the universities and elsewhere for the best and most promising bidders to resolve them. The important considerations, as far as universities are concerned, are that the problem definition is done in consultation, that university bidders for contract research are treated fairly, and that the university bidders especially are given the opportunity to bid on the basic aspects of the work. All these requirements demand full and careful consideration, but I believe that with goodwill and open lines of communication these problems can be, indeed are being, settled. There is of course no magic answer to the size of the bill for this applied research; no more than there is for any other spending decisions the government must make. How much for national defence, how much for foreign affairs, how much for national parks — There is no right level in each of these areas; more could be spent usefully; or some money could be saved. In principle, one must trust the political process to assure an acceptable division of the pie.

But it is in item (2) above — the good and forward looking research, the fundamental research which must be done at universities — which has government planners and accountants buffaloed because they have no ready method of recognizing such research nor of qualifying it. In desperation, some extreme answers have been suggested. One was that research of this sort in universities should be for pedagogic reasons only — i.e. to "teach research". To determine its desirable amount then requires a HQM (highly qualified manpower) forecast. But this is not a good starting point, because such forecasts are pretty generally impossible for the timescale of six to ten years that would be needed, and further because the professors in the universities often have the research capacity and society has needs for fundamental research quite independently of current student interest or enrollment.

I assume here that the case for fundamental research in universities has been made adequately elsewhere. I will only make one point which is often overlooked, namely that in the Canadian system it is only through the skills and facilities which research council grants have been creating that competence for applied research exists in universities. (And let it be noted that there is an important leverage here, in that small council grants for fundamental research often spawn large applied programs funded from other sources.) Still the question remains: how much should the federal government spend on it? My suggestion is that every professor should be given every opportunity to do good research to the limit of his abilities. If tough judgements are made through the peer system, and if full regard is had to the fact that too little money is extremely wasteful of the professor's time and often of the money that is granted, one can arrive at a relatively simple overall formula. I state categorically that in most sectors of all major universities, professors teach some 50% of their time and spend the balance in research and other professional work. A high estimate would be that 2/3 of the staff of our universities are willing to compete for research funds; a very conservative estimate is that 1/2 of these applicants would be found meriting support.

The need for funds of the successful applicant depends on many factors. The research effort of the typical individual professor under present conditions in the universities requires external support of between $10,000 and $40,000 per annum. Let us take $20,000 as a conservative mean. To illustrate then what we are talking about, I assume that there are 40,000 regular university staff members in Canada. Hence the total costs of the research funds they would need would be:

$$40{,}000 \times 2/3 \times 1/2 \times \$20{,}000 = \$267M$$

I readilly grant that each of the numerical factors I have assumed above would need fuller discussion. My example leads however to an answer of the right magnitude, seeing that council budgets for university support annually totalled a little more than $150M in recent years.

It is essential that a firm policy be developed about cost-of-living, or rather cost-of-research, increases. The rather silly situation of the early seventies where most grants were essentially stable, while salaries of research technicians and costs of books and oscilloscopes doubled and tripled, must not be repeated. One reason we have been given for this short-sighted policy was that the demands of the research community were apparently rising without any limit. The above formula on the contrary shows that the fund needs are clearly bounded, by being tied to the number of professors, whose number in Canada is strictly a function of stable, or even declining student enrollments. The total may fluctuate somewhat but will not run away for the next twenty years at least. Hence, in adopting a formula such as the above, the government would not commit itself to uncontrolled costs it is rightfully afraid of.

Use of the formula amount

Clearly this fund should not fluctuate widely, nor should it be permanently assured to the individual applicants. Over and over again it has been shown that for best results, allocations in fundamental research should be through peer review. With good planning, not much more than half of the total amount should be distributed to operating grants allocated through peer review and to national scholarships. The Councils should use the remainder to implement the "science policy" of the day; that is to say, for establishment grants, phase-out grants, negotiated development grants, equipment acquisition and reconditioning grants, and experimental programs — all on a strictly non-recurrent or limited-time basis. By this device one would achieve the stability essential for the building up of competence and of viable groups, and at the same time the Councils would retain the ability to respond to ever-changing scientific and socio-economic opportunities. As experience has shown, the system is easily damaged through the absence of an element of stability; it is of course equally vulnerable if there is no room for constructive responses to new opportunities.

Conclusion

This is clearly not a plea for particulary large increments to the Council budgets, and the amounts mentioned are obviously of the right order of magnitude in the present context. What is needed desperately, however, is that the claims made be recognized as an essential cost by the government and be protected against inflation and against other unforeseen calamities to ensure the services required and to restore the morale of their constituency, researcher and program administrators alike.

Dr. W.F. Hitschfeld is Vice-Principal (Research), McGill University.

Politicians have their say...

What do Members of Parliament think of the federal government's policies on R & D? In order to find out, the CAUT asked M.P.s from each of the four major federal parties whose legislative responsibility include science and technology to answer 11 questions relating to science policy and funding of research. Their answers were edited and are reproduced below.

In addition, the CAUT asked representatives of some of the major research organizations and from the manufacturing sector to answer the question: "What effect, if any, have the federal government's policies in support of Canadian scientific research and development had on the work of the members of your association organization / society? What changes in policy, if any, are necessary?"

1. *Compared with the investment in scientific research by other industrialized nations, the Canadian effort is anemic. Who is at fault here?*
2. *Is the Canadian neglect of scientific research more serious in some sectors i.e. universities, than in others? Is the neglect concentrated in particular areas i.e. social sciences and natural sciences?*
3. *Your party is on record as favouring an increase in R & D investment in the public and private sector from the current level of less than 1% of the G.N.P. to 2.5% of the G.N.P. What effect do you believe that such an increase in Canadian R & D would have on the nation's economy?*
4. *Economists, politicians, writers and scientists are increasingly warning that unless a system to transfer technology and research knowledge from university and government laboratories to the industrial sector is effected, our already massive unemployment problem and $10 billion trade deficit in high technology manufactured products will be further exacerbated. What specific role can the universities play in "technology transfer"? What about the federal government?*
5. *In a brief to the Canadian Tariff Board, the Canadian Association of University Business Officers pointed out that elimination of duty exemptions for equipment related to teaching or research may cost Canadian universities an additional $20 million annually. In your opinion, should these duty exemptions be eliminated or retained?*
6. *Dr. Frank Maine, Parliamentary Secretary to the Minister of State for Science and Technology, recently told a University of Western Ontario audience that "... university researchers have largely remained more-or-less aloof from the country's social and economic realities, concentrating on the advancement of their disciplines through basic research". In terms of the national priorities for science and technology and in view of the many competing claims for federal government funds, what roles should "basic" and "applied" research have in our overall R & D effort?*
7. *The Canadian scientific community has repeatedly urged the Government of Canada to establish a long-term science policy supported by budget engagements of 3-5 years updated annually, together with longer projections of a less precise nature as stabilizations measures. Is it the intention of your party to formulate and adopt a long-term, comprehensive science policy if elected?*
8. *On April 3, the Minister of State for Science and Technology, Judd Buchanan, told the Canadian Science Writers' Association that the shortfall in our nation's research effort is in the private sector rather than in government or university laboratories. Do you agree with this evaluation?*
9. *The Government of Canada, by Order-in-Council, recently appointed senior civil servants to head the Natural Sciences and Engineering Research Council and the Social Sciences and Humanities Research Council in spite of repeated previous assurances that the appointments would be of individuals with research experience. Would you term this an act of patronage on the part of the Liberal government?*
10. *The Progressive Conservative, New Democratic and Social Credit parties appear to be in fundamental agreement on the need for more Canadian R & D. Does this suggest that the 'Canadian R & D' question is potentially a major election issue?*
11. *How can Canadian researchers, individually and collectively, work to further their goal of a scientifically and technologically competent Canada in the federal election?*

Editor's note:
C.A.U.T. wrote to Monique Bégin, Judd Buchanan and John Roberts in early March asking for a statement of the Liberal Party's position on science policy and funding of research. On March 8, the Communications Coordinator of the Liberal Party of Canada wrote to C.A.U.T. stating that ... "the Party's position (on these matters) is articulated through the resolutions passed at National Conventions." A copy of the resolutions passed at the February 25 Liberal convention was enclosed; sections pertaining to R & D are reproduced below.

On April 13, C.A.U.T. wrote to the same Ministers asking for answers to the same eleven questions given the other federal parties. At the time of going to press no response has been received.

Resolution Number:
66. "That the Government: a) institute a national program of industrial R & D so as to establish and R & D research capacity in each of the major regions of Canada, taking advantage of the resources specific to each region. b) design the program to take maximum advantage of private enterprise and existing institutions. c) to this end, create immediately, a task force that would study the means of implementing such a strategy of industrial innovation.
85. "That the government acknowledge that a strong R & D program in the private sector is required to provide a strong industrial base.
86. "That the government as soon as possible stimulate and orient an R & D development policy so as to enhance the manufacturing industry's innovative capacity and thereby enhance this industry's competitive position in Canada and abroad.
87. "That R & D be supported by a 50% tax credit from taxes payable for Canadian R & D with a carry-forward feature.
90. "That the government increase its support of scientific research and encourage greater efforts by private industry in this direction, to make Canada more competitive in the modern technological world.
95. "That the government place increased emphasis on R & D in the broadest sense, including: a) increased public expenditure for scientific and technological research in Canada; b) the practical application of research towards increasing Canada's manufacturing sector.
122. "That in developing an industrial strategy, the government: a) develop a series of strategies for particular sectors of the economy by sector analysis groups, comprised of representatives of the federal and provincial governments and both sides of industry assisted by sector secretaries; b) seek the agreement of first ministers for the establishment of a national council on industrial development composed of all major elements in the economy, reporting to future first ministers' conferences with policy recommendations based in reports of sector analysis and in other sources.

J. Robert Howie
(P.C. York - Sunbury)

Mr. Howie, his party's science critic was formerly parliamentary DREE critic. He has been instrumental in articulating his party's position on science and technology in the House of Commons.

1. It has always been the policy of the Progressive Conservative Party that effective Canadian economic development can only come in a balanced economy. The fact that we do not have the sort of innovative structures for the promotion of technological advancement is both a cause and a symptom of our economic malaise. Nearly every society in which innovation is taking place at an adequate pace has a significant element of government leadership in the R & D sector. In fact, I would go so far as to say that in modern industrial nations, government activity in the support of science is virtually a pre-condition for a successful R & D effort. At present, Canada does not even meet this precondition.

2. The policies of benign neglect are completely pervasive. In particular the government has failed in the crucial area of stimulating industrial research.

3. Assuming the increases were concentrated in certain key sectors where there is potential for R & D to act as a trigger for industrial development, the effects would be very positive. In some sectors, such as energy production (viz. bitumem extraction technology) sufficient research could result in an improvement in growth prospects of some 3-5 percent annually in the mid-1980s and onwards.

4. I refer you to the excellent paper on this subject prepared by the Science Council.

5. Duty exemptions should be retained.

6. Both "basic" and "applied" research have roles that ideally are complementary not mutually exclusive as many bureaucratic political decision-makers. appear to believe. Obviously there must be a balance struck between the two broad avenues of endeavour. One of the spin-offs of the government's gradual starvation of the R & D sector is the intensification of a cult of struggle between "basic" and "applied" research disciplines. Given the government's basic failure in the creation of an acceptable research environment, Frank Maine's comments strike me as curious to say the least.

7. A Progressive Conservative government will adopt a five-year plan approach to the establishment of R & D priorities and programs as recommended by the Senate Study.

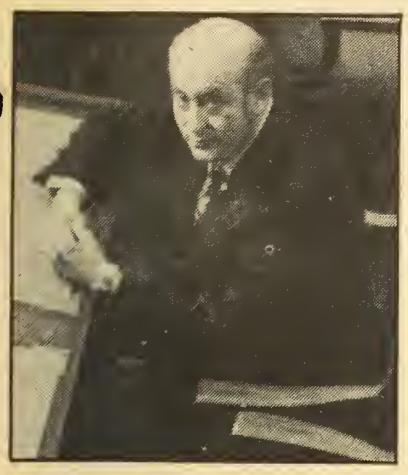
8. If this is Mr. Buchanan's perspective he certainly has his head in the sand — an occupational hazard with a part-time Minister. The shortfall has reached unacceptable proportions in both private and public sectors. As I note above, this is in large measure

Cont'd on p. 20

David Orlikow

(N.D.P. Winnipeg - North)

Mr. Orlikow was first elected to public office as a school trustee in Winnipeg in 1945, and has held public office continuously since then. From 1958 to 1962 he served in the Manitoba provincial legislature and in 1962 he was elected to House of Commons. He has been re-elected in 1963, 1965, 1968, 1972 and 1974.



1. Canadian efforts in scientific research are indeed anemic. In 1975 support for industrial Research and Development dropped to 87% of the 1969 level, of government R & D to 83% of the 1969 level and of university R & D to 67% of the 1969 level. In the same period in countries such as the United States, Great Britain and France, Research and Development enterprises have been treated either as well or better than they did in 1969.

There has been a deliberate attempt on the part of the present Government to scuttle university research. There has been a dramatic deterioration of funding of basic research at Canadian universities. Funding in real dollars by the National Research Council had by 1974 dropped to 60% of the 1969 level, and by the Medical Research Council to about 80% of the 1969 level.

The very low level of support of basic scientific research can be seen by comparing the proportion of the GNP spent by the Federal Government for basic research which has steadily decreased since 1969. In 1976 it was an appalling 0.07%, while in Belgium it was 0.3%, in Germany 0.3%, France 0.4%, Japan 0.4% and the Netherlands 0.6% of their G.N.P. In other words Canada spent about one quarter of the average support level of these West European countries and Japan.

The fault can only be assigned to the federal government which has consistently ignored the advice it has received from the scientific community.

2. Despite protestations to the contrary, from 1970 to 1978 industry and university sectors of the research communities have seen little if any growth in federal research expenditures while there was some growth in spending on research in Government laboratories.

According to the Lamontagne Committee, Canada and Scandinavia which have comparable populations have about the same number of researchers in universities, yet Canada has 9,000 more people than Scandinavia in Government laboratories and 20,000 fewer in industry.

Canadian neglect of scientific research is particularly noticeable in the natural sciences and engineering. The National Research Council represents 44% of annual Canadian federal expenditures on university posed scientific activites. It accounts for 76% of the annual accessible funds available in non-health areas. It is the primary support agency for sustaining university research activity in non-health natural sciences and engineering. The number of operating grants has increased by less than 10% over the past eight years and now stands at about 5,000.

Despite the NRC attemps to give priority to the operating grants program which sustains university research, the average size of each operating grant has fallen steadily as compared to the size of the Medical Research Council grants.

Graduate student enrollment in the physical sciences has fallen during the last eight years, and to replace the research manpower lost with each graduate student has cost substantially more than the cost of the supporting graduate students.

3. The NDP supports increased financial support for basic and applied research and development to a level of 2.5% of the Gross National Product within three years.

In our view the difficulties Canada is experiencing — the more than 1 million unemployed at the present time, the thousands of highly qualified, well educated Canadians for whom there is no work, and certainly no work in the fields in which they have been trained, are the result of our concentration over the past 25 or more years on the capital intensive extractive industries rather than on a modern, efficient, innovative and high technology manufacturing industry. Only if we set a goal such as I have indicated, will we be able to meet the needs of the Canadian people.

4. Only the Federal Government can ensure that "a system to transfer technology and research knowledge from university and government laboratories to the industrial sector" will be developed and financed.

Universities have played their part in this system through the research they have conducted. Given adequate funding they could, of course, do much more.

Universities could also participate in mission-oriented research. This is research which would involve a considerable element of basic research but is nevertheless directed towards a specific goal or mission. Countries such as France, West Germany and the Soviet Union have promoted such institutes. A Canadian example is Atomic Energy of Canada Limited.

Our growing surplus of manpower in the science and engineering fields could be funnelled into such Institutes. In Canada only about 8 people per 10,000 population are engaged in research and development programs, in France, West Germany, Japan, the Netherlands and Sweden an average of 25 people per 10,000 population are so engaged.

Surely a substantial number of our trained young people could be used effectively in the establishment of a series of Research and Development Corporations each directed at one of the problems which Canada faces — the search for new and renewable energy sources, urban transportation, pollution abatement, to mention just a few.

5. Since most of the equipment used by Canadian universities for research purposes is not manufactured in Canada, I see no value in the tariffs charged and would support exemption of universities from such tariffs.

6. It is a serious mistake to attempt to separate basic from applied science. In Canada, we have been slighting basic research. In 1974 Canada's increase over the 1969 support level was about 8 - 10% while that of West Germany was 150%, France 100%, the United Kingdom 60% and the U.S.A. 50%. Unlike Canada, these countries recognized that their basic research capability provides the foundation for future technological development which promotes a strong secondary manufacturing sector with its high growth of employment opportunities.

The failure to recognize this interrelationship between science and technology by Canadian governments has eroded our economic independence to the point where the Royal Society believes that this neglect has reached the point where our national economy may suffer serious long-term damage.

7. While the N.D.P. has not as yet dealt with this proposal specifically, this type of long-term, comprehensive science policy fits in with our whole approach to planning as a fundamental necessity for a modern, industrial society.

8. I would agree with Mr. Buchanan that the shorfall in Canada's research effort is most apparent in the private sector rather than in government or university laboratories, but this is true only in a relative manner. I have already outlined some of the deficiencies in our university research programs.

Mr. Buchanan, like other Liberal Cabinet Ministers charged with responsibility for scientific research, ignores the fact that Canada ranks last out of eight industrial countries in the per cent of the Research and Development dollar devoted to industrial research largely carried out in industry in other countires. Not only is the quantity of R & D conducted by industry in Canada very poor, but the quality appears to be poor. None of the significant innovations developed since World War II in the science-oriented industries was developed in Canada.

The reasons include: 1) The fact that so much of Canadian industry is in the resources area which requires little R & D. Canada has one of the lowest percentage of workers, in the manufacturing area (23%) as compared to West Germany's 38%, the U.K.'s 36% and the U.S.A.'s 34%. 2) Canada has the highest degree of foreign ownership and control of its industry among the O.E.C.D. countries. The major part of the R & D efforts of these companies increasingly takes place in the head office country. A classic example of this situation is Ford of Canada which had sales of $4.8 billion, a profit of $126 million, yet carries out no R & D in Canada and employs not one science PhD in all its Canadian operations.

9. I believe that the heads of our Research Councils should be individuals with research experience. I do not know whether the recent appointments of senior civil servants without scientific experience to these positions are in fact acts of patronage. But they are certainly designed to put into these positions people who will not publicly protest against the government's continued neglect of scientific research.

10. The Canadian R & D question certainly should be a major election issue. I believe that the Government must participate with industry in sharing the financing of industrial R & D through direct grants and cost-sharing programs, particularly in industries which will help to build our secondary manufacturing base and allow a diversification from our dependence on resource-based industry. This government participation must be shared on a shared equity basis.

We must deal with the problem of the multinational, foreign-owned corporations. Legislation is required to ensure that these companies invest a significant fraction of their profits earned in Canada towards R & D conducted in Canada.

The ability of Canada to function as an independent nation will depend on our capacity to develop a strong secondary manufacturing industry based on products and ideas developed from a heavy investment in Research & Development.

11. Canadian researchers have a vast store of knowledge about the needs of Canada in the field of scientific research and our deficiencies. They can and should so organize themselves that they focus the attention of the Canadian people on these issues. I believe that in a democratic society informed people will demand to get needed policies implemented, and Canada's scientific community can provide the needed information to the electorate.

Gérard Laprise

(Social Credit, Abitibi)

Mr. Laprise, a native of LaSarre, Que., his party's spokesman on science and technology has represented his riding in the House of Commons since 1962.

1. The Special Committee of the Senate on Science Policy formed in 1970 has published three volumes explaining clearly to the Trudeau government the problems existing in the Canadian scientific community and also what could occur if we wait too long for reform in this field.

Of the number of proposed reforms which we could mention the most important one is the increase of funds allowed for research and development to 2.5% of the G.N.P. Following inaction by the present government, the Senate re-studied the situation during the summer of 1975 and published a fourth volume imbued with anxiety that made the president of that committee, Senator Lamontagne, say in November 1977: ". . . since 1970 there has not been positive improvement at the level of volume and sharing of the natural and governmental effort in the field of scientific research and development".

The Social Credit Party of Canada lays blame for the catastrophic situation and the demoralisation of the members of Canadian scientific community on the Trudeau government which has been in power since 1968.

2. If we consider the measures proposed in the budget of April 10th, 1977, it seems that the government favors industrial research by reducing the taxes, which is profit-earning for the government party because it brings in favours from the large companies and funds for future election campaigns. This explains the cut-back of the funds allotted for the medical research in the universities, such as those that have been made in the past two months. The narrow-mindedness of the Liberal Ministers is revealed when they say that we have to reduce the funds allowed for the "basic" research identified with universities, in order to increase the funds allowed for "applied" industrial research.

3. Without distinctions being drawn for the type of research needed, the most evident effect of R & D is greater technological independence and subsequently economic independence from surrounding nations, mainly from the United States. This is the only way to provide advanced technology to your industries so they can be competitive at the international level, which will surely have a

Cont'd on p. 20

What effect, if any, have the federal government's policies in support of Canadian scientific research and development had on the work of the members of your organization / association / society? What changes, if any, in the government policy are necessary?

...and so do researchers, academics and manufacturers

Granting council budgets since 1970 have fallen far behind the increased cost of scientific research. The effects have harmed medical research and have been disastrous for research supported by the National Research Council. Research conducted within government laboratories has become less effective because of inadequate funding. In the universities also, those investigators still retaining grants for their projects have had to restrict the scope and quality of their research as costs exceeded their funds. In the severe competition for research funds over the past seven years, any weak investigators or unworthy projects have long since been weeded out, but now there are good applications recommended for funding by the pier review system, which have to be rejected. For example in the recent medical research council competitions, 20% of the applications for the renewal of ongoing research by experienced investigators could not be funded. As a result, there are large proportions of the professors in science and medical departments all across the country who are unable to continue their research with disastrous effects on teaching and training programs as well as on morale. Bright young new investigators coming onto university staffs have great difficulty in obtaining research funds and thus have their careers blighted or consider emmigration. Lack of a federal policy for industrial research strategy has caused a decline in the percentage of the Gross National Product spent on R & D from 1.4% in 1967 to 0.8% today, the lowest in the Western world. As a result, high technology industry is being phased out of this country with the attendant loss of career opportunities for our members and for Canadians in general as well as the obvious effect on our balance of payments. Because of the large decline in scientific activity in all sectors of the country, opportunities to develop new technology and the industry based on it are being wasted. For example, within ten years all the insulin we made as well as many other biological products will be manufactured by genetically engineered bacteria, but it won't be made in Canada. The sad commentary on the current state of the nation that once gave insulin to the world.

There must be stability and continuity in the funding for the granting councils. This can be achieved by guaranteeing budgets which reflect the real cost of doing research as well as factors for increasing sophistication. Three-year budgetary projections updated annually, have been endorsed by several ministers and would ensure stability. We need the formulation of a research policy which would enable research and training priorities to reflect the economic and social goals of society at large. This should again result in stability and a rational growth in those areas perceived to be of national importance. Methods must be devised for routine consultation with the science community to transfer information on funding, policies, priorities and key appointments. Finally, we need a comprehensive policy for industrial R & D. All the federal opposition parties endorse the concept that our total efforts should be trebled over a five-year period, to reach 2.5% of our GNP. This figure is comparable to that for leading industrial nations such as Germany. The wise implementation of this policy required detailed planning incorporating all of the elements discussed in the points above.

Dr. Neil Madsen *Professor of Biochemistry, University of Alberta and President of Canadian Federation of Biological Societies.*

The federal government, as a matter of policy, allowed the funding of the Medical Research Council, the Natural Sciences and Engineering Research Council (formerly NRC) and the Social Sciences and Humanities Research Council (formerly Canada Council) to run down as a consequence of inflation. CAUT has been pressing (1) to stabilize the grants according to the implicit price index for scientific materials, (2) to recapture the purchasing power lost since 1970, and (3) to secure long-term planning. The failure to take these three steps has seriously undermined university research and thereby significantly hurt the interests of members of CAUT.

Dr. Donald C. Savage *Executive Secretary, Canadian Association of University Teachers.*

Lack of government support for both basic and applied research has resulted inevitably in a reduction of research in both areas. Non support has produced a strong negative effect on the recruitment of qualified people into science. If this policy continues Canada may lose a whole generation of imaginitive scientists who are needed in both research and development and in high technology industry. In our view the lack of research and development and of high technology industries in Canada is indeed partly responsible for our current economic depression.

No single change in policy will solve this very complex problem. We recommend the following:

1. The government must increase substantially its support of research and development in Canada. We note that a step in this direction was announced April 10 by Mr. Judd Buchanan, Minister of State for Science and Technology who stated that 400 new jobs would be created to start this process. This program should be expanded. We note also that the Minister of Finance in his budget speech of the same date indicated that the government is prepared to provide tax incentives to make it more profitable for high technology companies to do R & D. This is a step in the right direction.
2. At the same time it is imperative that basic scientific research be encouraged to maintain a strong base for applied research.
3. It is essential that Canadian scientists, not public servants, play a major role in the development of scientific policy for Canada.
4. The government must encourage the interaction of government, university and industrial scientists in order to foster industrial innovation and thereby increase job opportunities.

Dr. Harold Johns *Head Physician, Ontario Cancer Institute and President of the Canadian Association of Physicists.*

As in other sectors, inflation has severely affected Government research. Recruitment of research scientists has been to replace positions lost through attrition and does not replacd growth (2,000 research scientists in 1968 and 2,000 in 1978 increasing the internationalizing of the environmental group). Contracting out has created additional problems. No new funding has been alloted specifically for this purpose and the cost has been born by already inflation-depleted budgets of the Government laboratories. Nor has contracting out been 100% successful. It has been difficult to obtain the necessary expertise. Modifications of projects in mid-stream as results become available is almost impossible. Quality monitoring of projects may be as time-consuming as the original contract alloted. Funds are lost to the department concerned if the project overruns the fiscal year. High quality researchers are sometimes reluctant to do contract work in which publishing and proprietary rights are ceeded to the crown.

Canada must increase its science research in all sectors: university, industry and government. The talent is available, eager, and willing. The recent industrial conference on R & D concluded that "high-technology" could be a major solution to Canadian economic problems, both now and in the future, as international trade barriers are lowered. The research manpower is available but not the funding. It is not a solution to play musical chairs with the small amount of government funding by shifting it about from government to industry to university, etc. For one thing, the manufacturers and large companies which are foreign-owned should be forcibly persuaded to act as good corporate citizens and carry out at least a commensurate amount of their R & D in Canada. Nor should contracting out in government laboratories be done with expense in in-house research. Many government laboratories are international centers of excellence and unique expertice. Just as in industry or university government laboratories require a stable budget to retain their key personnel and maintain their research momentum.

Additional funds under revised regulations should be available to make it possible to contract-out projects to leading experts in universities and industries. Controls would secure at least a share in the publishing and proprietary rates for the university on industry researchers and there should be more fiscal flexibility to allow for project modification and to limit extensions past the fiscal year-end without a lapse in funding at the expense of the department.

Paul Odense *Secretary, chemistry Sub-Committee, Atlantic Provinces Inter-University Committee on the Science.*

Two major changes in the federal government's policy are needed:

Firslty, to insure the presence of a local scientific community if we wish to profit from the international pool of knowledge. I am very concerned that young new scientists are not entering into the system. Only 30% of the new applicants for MRC grants were funded this year, yet 70% should have been funded. This is so very important, as we are attaining an "old" science personnel.

Secondly, STABILITY. We can not continue with the give-and-take policy in regards to grants, but should aim for establishing a long-term science policy supported by long-term budget engagements.

Dr. Michel Bergeron *Association of Scientific, Technological and Engineering Community of Canada.*

The federal government's research policy has largely been used to subsidize private enterprise and profits. It is doubtful that these policies have had any real impact on job creation which would not have occured had the Government stayed out of the game altogether.

In the future, much tighter controls must be placed on funding of R & D. The government itself should certainly increase its efforts in R & D, but should look for commercial applications itself as opposed to simply handing over the research to private industry. Minimaly, if governments are to continue funding R & D through grants and tax incentives, the companies should be prepared to relinguish equity to the government equal to the value of the funding.

Canadian Labour Congress.

Judging by the federal government's performance in the area of Canadian research and development, no particular economic incentive has been given to industry during the reign of the present administration, until very recently, when certain monetary incentives were announced by the Minister of Finance in the proposed Budget. In respect to other forms of assistance to Canadian industry, generally it can be stated that the federal government employees do not have sufficient knowledge of a particular industry, and invariably little is know with respect to the financial operation of such industry to make a comprehensive decision. Such federal employees are actually not competent to deal with industrial management, and therefore leave a company's personnel indifferent and frequently discouraged to pursue federal assistance programs. Lack of foresight and narrow-mindedness is frequently encountered as characteristics of many individuals in the federal and provincial government agencies.

It would appear that a major change should be made in preparing the government personnel to cope with industry. Possibly, there should be an apprentice program on the part of governments to prepare their people to understand industrial requirements.

J.J. Havlik *President, Canadian Machine Builders' Association.*

The members of the C.S.C.I. have been seriously curtailed in their ability to conduct the level of medical research which is expected of them. Since virtually all medical research involving patients in hospital beds is done outside of government institutions in Canada and for the most part by members of the C.S.C.I., any cutbacks in funding by the MRC will have an immediate dilaterious effect. For the year 1977-78, it now appears that the inadequate MRC budget will have the most serious consequences from coast to coast.

The C.S.C.I. would like to see two changes in government policy, one of which has already been promised by three Ministers, but that has not yet come to pass. The promise I am speaking of refers to stability in funding of medical research. The second change, also recognized to be of great importance by the Hon. James H. Faulkner when he was Minister of Science, is for government to establish a level of funding which will enable investigators to continue their work in the face of rising research costs. Specifically, this suggests that approximately 1,400 to 1,500 Canadian biomedical researchers whose excellence is already established, should be kept in business. In the last several years, cyclinal changes in funding plus inadequate absolute levels of funding have been the main characteristics of the "non-policy" of this government. It seems to me the cornerstone of a new policy must be the recognition of these two necessary changes.

Dr. David Z. Levine, *Secretary, Science Policy Committee, Canadian Society for Clinical Investigation.*

The crisis in the federal support of medical research, both the contracting component of year-to-year funding and the lack of a long-term commitment was brought to the attention of the general public in 1976 leading to the formation of the CHR. CHR has continued to grow as a national organization due to the fact that the government has not responded to the expressed wishes of the consumer.

Dr. Hy Goldman *Vice-president, Canadians for Health Research.*

For more statements on research and development, See p. 19

The whole is less than the sum of its parts

C.K. Knapper, G.L.-Geis, C.E. Pascal and B.M. Shore, editors. **If Teaching is Important... the evaluation of instruction in higher education.** A CAUT Monograph. Clarke Irwin and Company Ltd. Toronto, 1977. $5.95. pp. 230 & X (with indices).

This volume is the second in the series on problems facing Canadian universities. The first, but can you type ?, a documented account of the status of women in Canadian universities, was reviewed in the CAUT Bulletin in December, 1977. Further monographs planned or in preparation will deal with such topics as university funding, Canadian universities and nationalism, and collective bargaining in universities.

Eight topical chapters, including one by each editor and a ninth titled "Conclusions" under the pen of all four editors, comprise the current volume. Chris Knapper is senior editor, having written an eight-page general introduction and one or one-and-a-half page introductions to each of the first eight chapters. Geis, Pascal (now at O.I.S.E.), and Shore are all directly associated with the Centre for Learning and Development (C.L.D.) at McGill, and Knapper is teaching resource person at Waterloo University.

In order, the eight topical chapters are: 1. "Evaluation: Definitions, Problems and Strategies" (Geis); 2. "Student Learning and the Evaluation of Teaching" (Janet G. Donald, C.L.D.; and Shore); 3. "Student Evaluation of Instruction" (Gilles G. Nadeau, Moncton); 4. "A Framework for the Evaluation of Teaching" (Arthur M. Sullivan, Newfoundland); 5. "The Teacher and the Goals of the University" (Bernard Trotter, Council of Ontario Universities); 6. "Evaluating Academic Functions Outside the Classroom" (Pascal); 7. "Evaluation in Non-Academic Settings" (Paul A. Friesen, deceased); 8. "Teaching Evaluation and Academic Freedom" (Knapper).

Geis provides some useful distinctions and advice on both evaluation for purposes of improving one's teaching (formative), and evaluation for purposes of personnel decisions (summative). His experience as Director of C.L.D. is evident in the high quality of the points advanced. He makes a positive kick-off contribution to this set.

Donald and Shore discuss relationships between concepts of learning and teaching in an enlightening fashion. They dispel popular fallacies including the one that holds that a primary determiner of student learning is teaching quality. Like Nadeau's contribution, their chapter is heavily influenced by contemporary North American research in the area of instructional psychology. Their advice, however, appears to be sound for both faculty members and administrators in a variety of academic and professional departments, again reflecting their experience at C.L.D.

Nadeau's chapter on student evaluation of instruction is clearly the most thorough and well-researched in the volume. Unfortunately, his survey is now some four years old, and the literature has burgeoned in the interim. It should, however, prove both enlightening and useful to those engaged in research and development activities in the area.

Sullivan's chapter is an interesting discussion of what he calls self-evaluation, similar to formative evaluation, and formal (summative) evaluation, including the recommendation of an annual performance review for all faculty members. The procedures he recommends are fair, and his reasoning is so sound, coupled with a sincere concern for morale, that one hopes other administrators will take a leaf from his book.

Trotter's essay is the shortest (8 pp.). In it he discusses accountability of teachers and the sort of loyalty to the institution (university) which has flagged considerably in recent years.

Pascal's chapter refreshingly reminds the reader of the many contexts outside the lecture hall wherein a modern faculty member makes contributions to learning.

Friesen's article is an unabashed defense of the "systems approach" to education that could easily be the point of view of a corporate executive recently appointed to a board of governors. This and Trotter's piece were included to give the work "popular" appeal.

Knapper's article discusses a recurring theme in his writing, the difficulties with and disadvantages of student questionnaires. This time they are seen as threatening to traditional conceptions of academic freedom. If student questionnaires take a beating in chapter eight, they are out for the count by chapter nine, where the editors conclude that a moratorium should be declared on using student questionnaires for summative purposes. The main emphasis of the book heretofore has been on formative evaluation, so it is a bit puzzling to the reader to see the balance dramatically shift at the end. Especially problematic in the context of other reasonable and optimistic conclusions is this one, which runs contrary to widespread practice (and the cautious advice of Geis, Nadeau, and Sullivan, not to mention the CAUT Guidelines—co-authored by Knapper). The editors appear to be well intentioned but the net effect, if any, of this intemperate lapse may well be to detract from the impetus to improve.

Important work done in Manitoba on the "Dr. Fox Effect" (when gibberish is rated favourably), and in British Columbia on self-evaluation and video tape feedback escapes mention in this work, as does the considerable amount of research and development activity performed over the years at the University of London Teaching Methods Unit and at Lancaster and at Macquarie and Melbourne Universities in Australia.

The decision to appeal to both popular and academic markets for this series was unfortunate, since the effort is pretty much guaranteed to fail before it is mounted, and the potential contribution to either readership is thereby blunted. The Trotter and Friesen articles, in particular, have this "scatter shot" effect. A more justifiable alternative would have been to attempt to address the U.S., British, and Australian academic markets and substitute for the popular appeal chapters reviews of self-evaluation and peer evaluation parallel to Nadeau's excellent chapter on student evaluation. The non-university readership could best be addressed by publishing a series in the popular press describing a day in the life of a professor and the like. Of course, we might be content to remain cloistered and allow the general public to fantasize over the highly paid do-nothing (except for number one) egghead portrayed in the scandal sheets or the tweedy professor cum Don Juan of the bestsellers. This volume could have profited from inclusion of a radical critique of the liberal doctrine of indefinite perfectability (in teaching) if seasoning were desired.

These remarks not withstanding, at least four or five of the chapters, especially Nadeau's, are notable contributions to the literature on instructional evaluation in higher education. These deserve to be read widely in the academic community in this country and abroad for reasoned guidance in research and development activities and in the practices of formative and even summative evaluation of teaching.

Something should be done about the unacceptable lag which caused the documentation of this and the earlier volume to be several years dated at the time of publication (is anyone listening ?).

Stephen F. Foster

Small may not always be beautiful

Report of the Consultative Group on the Needs of Scholars at Small Universities, The Canada Council, 1977.

In fewer than forty pages, this Canada Council pamphlet outlines and proposes measures to alleviate the special problems that beset researchers at Canadian universities which, because of their size or their distance from metropolitan centres, do not provide the facilities and incentives for research that are available to the scholar in the larger university. Advanced research is often hampered at smaller universities by heavy undergraduate teaching loads, by absence of graduate programmes, by underdevelopment of library resources, by shortage of internal funds, technical resources and support staff, and by lack of extensive peer stimulus. Also, small universities tend to expect the academic to function primarily as a teacher rather than as a scholar, placing a premium on pedagogical rather than research abilities. With its care for the humanistic development of the individual student, the small university can provide one of the most rewarding of educational experiences for professor and student alike, and the academic whose main vocation is teaching rather than frontier research will not find the characteristics of the small university irksome. But the case is different for actual or potential frontier researchers, and it is to their situation that the report responds.

To provide Canadian scholars, especially those at small universities, with increased access to active researchers and ongoing research projects at other Canadian universities, the Consultative Group proposes two programmes. The first is a Research Visits Programme to finance visits by research scholars to universities where there are resources available that are unavailable at their home universities. The second and more innovative of the programmes is a Research Workshop Programme, which would bring participants together for up to ten days under the direction of experienced researchers to familiarise participants with methodology or current goals and problems in particular areas of research. Though limited in scope, these programmes clearly point in the right direction.

That such programmes should need to be formulated, though, is symptomatic of the malaise afflicting the Canadian academic community, caused by budgetary restrictions, falling enrolments, static employment opportunities, and the rest — the 'new reality' as some are pleased to call it. An alarming state of personal frustration and institutional constipation now exists. The system that was previously characterised by physical mobility and intellectual interchange is becoming more and more clogged. People and ideas no longer move as easily as they used to or as quickly as they should.

It is, of course, unrealistic to suppose that an expansionary phase like that of the 1960s is likely to be with us again in the near future. It is equally unrealistic to suppose, as some administrators have been wont to do, that the salvation of academe lies in wholesale onslaughts on the economic position of faculty or on the institution of tenure in the interest of 'academic flexibility' (to use the latest in a long line of glib code-words). If the current state of affairs is to be ameliorated within the next few years, it is likely to be by gradual and partial and undramatic measures which will stimulate some cautious movement within the system as a first step towards a fuller restoration or professional confidence, mobility and vigour.

A comparable thrust in the direction of alleviating the problem of stagnancy to some limited extent is provided by the recently announced faculty exchange programme, jointly sponsored by CAUT and AUCC, which is intended to promote temporary exchanges of posts between professors at different Canadian universities. But perceiving problems and initiating measures capable of alleviating some of their worst effects does not guarantee success. The CAUT-AUCC exchange programme, which invites faculty members to seek out colleagues with whom to exchange posts for a period of a year and to submit to their universities joint applications, has elicited little response to date, despite the fact that

Cont'd on p. 19

Teaching not important enough for tenure, merit and promotion

Peter Seldin. **How Colleges Evaluate Professors: Current Policies and Practices in Evaluating Classroom Teaching Performance in Liberal Arts Colleges.** Blythe-Pennington, Croton-on-Hudson, New York. 1975. Pp. 90. $3.50

Trevor Pateman (Ed.). **Counter Course: A Handbook for Course Criticism.** Penguin, Harmondsworth, England. 1972. Pp. 393. $2.95

Peter Seldin's book is based upon his Ph.D. thesis and describes an investigation of procedures used to evaluate faculty for promotion, tenure and merit increases in four-year liberal arts colleges in the United States. It is an attempt to bring up to date the well known 1966 study by Astin and Lee, which reported a widely-held belief among university administrators that teaching performance is, and should be, a major factor in the evaluation of faculty. At the same time, however, the methods used to assess teaching effectiveness were found to be so inaccurate and unreliable that meaningful evaluation was virtually non-existent in the colleges surveyed. In 1973 Seldin used essentially the same research method to see whether the situation had changed. Some 410 academic deans in liberal arts colleges across the USA (out of a total of 491 deans approached) completed a questionnaire describing evaluation practices in their institutions, as well as giving their own views on the matter.

Classroom teaching was still cited as a major factor in evaluating overall faculty performance by more than 99% of the deans responding; in contrast, both public service and publication were rated as minor factors. So much for the traditional lip service paid to the importance of teaching — but how is teaching to be measured? It appears that this sample of deans relied overwhelmingly on informal evaluations by chairmen or by themselves, supplemented to some extent by reports from committees and by results of student course ratings. Interestingly enough, as many as 60% of the deans said that they used scholarly research and publication — *as evidence of teaching performance !* Compared to the earlier Astin and Lee study, there appeared to be a greater use of student ratings for assessing teaching performance. The deans readily admitted that few of their institutions had done any research on the validity of the rating forms being used — although the percentage reporting such research did rise from 0.6% in the earlier study to 8.3% in 1973.

Perhaps the most interesting section of the study is that where the deans were asked to give their personal impressions, rather than merely reporting institutional policy. In spite of the obvious shortcomings in the evaluation systems, these administrators (or 79% of them) expressed rather smug satisfaction with "all" or "most" of the evaluation policies and practices at their college — and they reported that, in their opinion, approximately 92% of their faculty were similarly satisfied ! The deans were strongly in favour of across-the-board course evaluations, preferably done informally by department chairmen, as long as the results were not made public; they were in favour of classroom visits,* rejecting the notion that such visits constitute an invasion of privacy.

What do we make of all this? Seldin does provide one-and-a-half pages of recommendations, but they generally miss the point. (Among them is the idea that "a prestigious panel" of administrators, faculty and students, "funded by a substantial grant" develop a blueprint for faculty evaluation that could be applied throughout the nation; other recommendations are that each institution should appoint "a permanent committee on faculty evaluation" and that "annual faculty performance reviews should be required at all institutions" — things that are practice in many Canadian universities). More to the point is the conclusion that — at least if we can generalize from this study of liberal arts colleges — nothing much has changed with regard to the place of teaching despite the student revolts of the 1960s and the public pressure on colleges and universities to be accountable. Apparently there is general agreement that teaching is important — but not important enough to be taken seriously when it comes to the matter of objective evaluation for the purposes of tenure, merit and promotion. In this respect, the findings from Seldin's book are worth reading and taking to heart. Whether the casual academic reader would wish to wade through what appears to be a virtually unaltered graduate dissertation is another matter. (For example, each chapter begins by stating the purposes of the chapter in point form; they are then reiterated at the end of the chapter; and there is a final summary chapter which goes over the ground yet again.) In view of the frequent criticisms of the rising costs of books published in Canada (versus the USA) it is worth comparing this book with the first two volumes in the CAUT monograph series (one of which also deals with the topic of course evaluation — though largely from the standpoint of "self-improvement" rather than administrative decision making). The CAUT books run to well over 200 pages, are quite attractively produced, and retail for $5.95. Seldin's book contains 90-odd pages of typewritten script reproduced by photolithography and was priced at $3.50 in November 1976. In spite of that, the book has already run to a fourth printing !

To remind ourselves of just how much the university and its teaching methods were under attack in the 1960s, it is worth glancing at **Counter Course**, edited by Trevor Pateman and described as "A Handbook for Course Criticism". Written after the heady days of the student movement, the book is a collection of essays by students and ex-students of courses in higher education (primarily in British universities). Contributions provide a critique of traditional assumptions of many disciplines (even mathematics and chemistry are included). The aim is apparently "to furnish students with the tools necessary for articulate and purposive criticism of individual courses at institutions" — largely from a Marxist perspective, it might be added. Although the book is largely concerned with course content rather than teaching methods, to read some of these essays is a salutory experience for those of us who are inclined to take our teaching and our disciplines for granted.

* In fact Seldin uses the word "visitation", which appears ever more frequently in the evaluation literature. My Concise Oxford Dictionary defines visitation as a "bishop's examination of the churches of his diocese", an "unduly protracted visit or social call" or "divine dispensation of punishment or reward". Perhaps this is the more appropriate term after all !

Christopher Knapper

About the reviewers

Prof. Gordon Jones, CAUT President, teaches English at Memorial University... Stephen F. Foster, is at the Faculty of Education, the University of British Columbia... J.B. Hartman teaches Philosophy and is with the Development and External Affairs Department, Algoma University College... Prof. Christopher Knapper, teaching resource person at the University of Waterloo, is the editor of "If teaching is important..." the latest CAUT Monograph.

New teaching techniques pay dividends

Report on Teaching: 5. Chance Magazine, New Rochelle, N.Y. January 1978, pp. 73.

Now in its third year, this series is nearing its conclusion with the publication of the final issue dealing with the particular disciplines; in this case Anthropology, Foreign Languages, and Physics. Many of the teaching strategies described in earlier Reports — computer-assisted procedures, field study, independent study, internships, lecturing, models, modular instruction, multi-media approaches, peer teaching, research, self-paced instruction — are to be found in the outstanding courses and programs outlined in this Report.

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In their studies of societies, anthropologists have emphasized social roles, continually changing in number and complexity, at the expense of human feelings, more constant but differing significantly in their modes of expression over time and between different cultures. To develop an awareness of the important affective forces lying behind observed behaviour, teachers of anthropology must develop and convey to their students a greater awareness of the affective patterns of each society and culture. Among the ways in which this can be achieved are increased numbers of non-Western faculty members, a greater number of area courses, and strengthened techniques of comparison between Western and non-Western ways of doing things.

The role of the student as an outsider looking in is undergoing rapid reversal in anthropology, according to the teaching experiences described in this Report. Learning by doing is the theme of several courses, one incorporating field experiences usually found only at the graduate level, another consisting of a summer archeological field school which unites faculty and students on research projects. The outdated traditions of emphasizing field work in remote, exotic places and delaying field work until graduate school are abandoned in a field methods course which introduces students to the new ethnographic semantics within the context of more familiar techniques in investigating such sub-cultures as tramps, truckers, and garbage collectors.

The inability of students to integrate the vast subject matter of their major discipline is a problem for teachers in all academic areas. One anthropology department has devised a senior seminar which requires students to synthesize their learning experiences on the level of personal involvement by developing a personal vision of anthropology. In another institution, students are assisted in developing an awareness of anthropological knowledge as a collection of constantly shifting perspectives by involving them in debates on past and current theoretical controversies. To counteract the excessive flexibility of free-form programs and to guide course selection, another anthropology department has produced a handbook of "tailored, relevant anthropology course sequences (TRACS)", to help students to achieve their career goals.

Tramps... new grist for anthropological mill?

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Foreign languages have experienced diminished student enrolment in recent years due to the shift from the structured curriculum to the open elective system and the dropping of language requirements. Some academic departments have adapted by initiating changes in the form, content, and emphasis of their foreign language programs. Modification of the academic calendar to include minicourses and immersion courses, combined with study-abroad programs and language camps, have increased learning opportunities for a changing clientele. Interdisciplinary studies, the teaching of another academic discipline in a foreign

Cont'd on next page

RESEARCH ... *from p. 16*

I think that it is apparent that there has been a lack of funds in support of Canadian-based research which is a reflection of a lack of long-term planning. This has had a strong impact on university-based research which I think concerns us very much. The effects are: a reduction in enrollment in research training programs in Canadian universities; prolonged post-doctoral positions of Canadian-trained Ph.D.'s, most of them outside of the country; a form of brain-drain, because of a lack of attractive positions for these people to come back to Canada; poor security and extreme difficulty in securing adequate research funding. In the health-care field, specifically, the federal government has not shown sufficient leadership in providing incentives for the establishment of mechanisms for disease control. For example, we should not have to depend upon other countries for knowledge and goods to prevent and control infectous diseases such as influenza, or rabbies, etc.

Governments must begin to collaborate with the specific community to establish long-term policies. There needs to be a conserted effort to restore confidence in university-based research programs, and any policies towards research should have a healthy mixture of applied and basic programs. The federal government should take a serious look at setting as a priority, a progression towards a strong center for disease control and proceed towards being self-sufficient in providing Canadians with protection against the various infectous diseases. This is not to de-emphasize many other areas involving microbiology in the environment industries, etc., which have an effect on so many Canadians.

Dr. Max Chernesky *Associate Professor, Virology, St. Joseph's Hospital, Hamilton, Ont. and Science Policy Representative, Canadian Society of Microbiologists.*

SSHRC... *from p. 13*

regarding the gaps which have to be filled and the ability of existing programmes to meet these needs.

If the new council is to conduct regular reviews of each discipline that falls within its mandate, it should also be prepared to assume an active role in promoting certain kinds of research. Such an idea, of course, is often anathema to scholars in the humanities. Nevertheless, it should be pointed out that many commentators on science policy have noted that undirected financing of scholarship favours the stronger at the expense of the weaker and that only an interventionist policy can succeed in encouraging scholarship in neglected areas or by new means. But aside from this argument, the Government may well force the Council in an interventionist direction. NRC, for instance, has already set up a special committee to encourage scientists to do research specifically related to Canadian problems.

Where individual programmes are concerned, the new council should assign top priority to implementing certain Canada Council-approved initiatives designed to encourage academics to keep up in their fields. It should also institute a programme of "prestige" scholarships for senior staff, continue the present programme of research grants and launch a series of new programmes which have been recommended in reports submitted to the Canada Council by Consultative Groups on Research Instruments, the Research Needs of Small Universities, and others.

To date Canadian humanists have found themselves isolated from both government and the public at large. If the new council adopts many or all of the suggestions made in this article, however, the way could be paved for the humanities to come in from the cold.

Dr. Steedman is Executive Director of the Social Sciences and Humanities Research Council, formerly known as the Humanities Research Council.

Canada's deteriorating position in terms of Research and Development (R & D) is now well documented: not only does Canada devote the smallest percentage of GNP to R & D among our major trading partners, but the ratio has been declining steadily in the 1970's. The average annual increase in RD expenditures, since 1963, is 9.3 per cent. Outlays in constant dollar terms have been relatively unchanged since 1969, a disturbing eight years.

One reason why Canadian industrial R & D should be encouraged is the overwhelming evidence of the economic benefits of a strong R & D effort. Numerous studies in the U.S.A. show that the technological innovation flowing from R & D is responsible for at least one-third of economic growth. Productivity gains from innovation reduce unit costs and are a prime factor in fighting long-term inflation. They are also fundamental in the continuing improvement of our standard of living.

A second reason to encourage Canada's industrial R & D effort relates to our trade deficit in manufactured products. Canada's failing scientific effort is partly the reason for the growing weakness of Canadian manufacturing, a problem now widely documented and commented upon by numerous sources such as the Conference Board in Canada, the Economic Council of Canada and the Science Council. Disturbing evidence of our fundamental difficulties is provided by our trade deficit in end products. As the Science Council has outlined in "Uncertain Prospects", a major portion of this deficit is due to Canada's position as a net importer of medium and high technology products. Canada cannot afford to stand aside from the international technological race.

If our trade position is to improve, the Canadian government must stimulate the nation's industrial R & D effort so that we can compete in the race for leadership in technology. To paraphrase Dr. R. Gilpin, a well-know American economist, "Canada will have to run faster just to stay in the same place."

There can be no doubt that our industrial R & D deficiency must now be regarded as a major problem facing Canada. Serious efforts must now be made to reverse this debilitating trend.

First, the firm investing in R & D cannot appropriate the full return because there are many spillover benefits, spinoffs in other industries and other external benefits that cannot be marketed by the originating company. Second, despite potentially high returns, the risks in any single R & D effort are high, and the scale may be prohibitive. Third, there is likely to be a long delabetween the R & D expenditure and the pay off in profits, so that this type of expenditure is particularly vulnerable when a company is in a cash squeeze. All three points support the need for meaningful incentives.

The Canadian Manufacturers' Association *(from Pre-Budget Submission to the Hon. Jean Chrétien, Minister of Finance, Feb. 15, 1978.)*

We welcome the increased incentives by the government. We feel that this will help the Canadian companies to improve their cash flow, but in terms of creating more innovative incentives, this cannot be accomplished alone through grants, etc. Innovation comes from the market, not the grants or innovations. R & D doesn't create strong companies. One of the problems is that we do not have Canadian companies or manufacturers who are strong enough to withstand the front-end cost of R & D. They are not given the markets for expansion, etc. To create innovations, we must foster and nurture Canadian-owned enterprise through a variety of means.

Pat Johnstone *Director of Research, Canadian Federation of Independent Businesses.*

SMALL UNIVERSITIES...

from p.17

participating univerisites will be assuming incidental costs incurred by participating faculty members. In the case of the recommendations of the Consultative Group on the Needs of Scholars at Small Universities, we are cautioned by the Director of the Canada Council in his Foreword to the booklet that the recommendations "cannot be acted upon until additional funding becomes available". The cautionary note rings hollowly and all too familiarly in the ears of academics of the 1970s.

G.P. Jones

NEW TEACHING... *from p.18*

language, and computer-assisted instruction are among other such reforms. Flexible curricula adapted to diverse learning styles and variable credit systems form the basis for individualized programs of study. The establishment of career-related curricula is another indication that foreign language departments are changing with the times, developing new approaches to meet changing social demands.

Increased enrolment in foreign language courses is the product of techniques equally adaptable to other academic areas: vigorous public relations activity, enthusiastic and imaginative classroom presentations by instructors, and intensive student involvement and sustained participation. Flooding the campus with posters and brochures, contacting all incoming freshmen, establishing a policy of "caring at the office door," and paying close attention to course evaluations, has increased one foreign language department's enrolment by 50 per cent in the past decade, compared with an overall university enrolment increase of only 10 per cent.

Among the other programs described in this Report, one attempts to instill in students the excitement of communicating in another language by combining the elements of drama with fast-paced, intensive language drills; another recounts the details of a career-related foreign language work-study program for students drawn to jobs in foreign affairs and international business.

Of the several programs of intensive language instruction, two have experienced particular success. The Dartmouth Intensive Language Instruction Model, which employs undergraduate apprentice teachers trained in special workshops, has spawned similar programs at 20 other institutions. At the 62-year-old Middlebury College Language Schools, students each summer live the language of their choice in the company of both foreign and domestic professors.

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The teaching of physics has undergone marked changes to meet the demands of new student attitudes and needs. Laboratory work, a general requirement of even introductory courses, has taken a variety of forms — practical, theoretical, research oriented, or experimental — depending on the educational bias of the teacher. The needs of nonscience majors has stimulated the development of physics courses for musicians, environmentalists, and other generalists. Although plans for diversifying the uniform major curriculum into two tracks — research, for those headed for graduate study, and synthesis, for those preparing for professional careers — still remain unfulfilled, many innovative courses have been inspired by them. However, in the absence of any adequate educational evaluation, it is difficult to know whether innovation, as a form of change, constitutes improvement.

A dismaying fact of higher education is that many students enter university unable to reason — to think logically and independently, to observe and infer, to analyze, criticize, and explain — and some of them depart with this disability intact. "Inquiry-oriented teaching," a modified version of the personalized system of instruction (PSI), is designed to move prospective school teachers of science from their fact-saturated world to an understanding of physical phenomena through a planned program of personal discovery and the development of their powers of abstract reasoning.

Computerized instruction or the traditional lecture-lab course: which is best ? Both have achieved success in different academic environments. Enthusiastic proponents of a Physics Computer Development Project which uses PSI, point to the computer's flexibility in providing a unique educational experience for each student through instructional dialogue, the opportunity for extensive use of graphics, and the computer's application in monitoring student progress. On the other hand, top awards for creative contributions to the teaching of physics have gone to lecturers who enjoy the happy combination of first-rate students, enthusiastic colleagues, excellent texts, and fine laboratory and audio-visual facilities.

Also described in this issue are such diverse programs as a hard core theoretical course for captive non-physics students who study vibrations and waves, and energy, and the campus-wide Undergraduate Research Opportunities Program at the Massachusetts Institute of Technology, which has produced tangible results in career direction, patented inventions, and published articles.

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In the attempt to improve the quality of college and university education, it is necessary to attract to teaching, the less visible aspect of professorial activity, the prestige accorded to the more visible activity of research. In the absence within academic disciplines of any formal associations based primarily on teaching, a major problem is how to secure even a modicum of informal recognition for endeavours to improve instructional effectiveness.

One possible direction recommended in this Report is to develop communities beyond academic disciplines, such as in-service workshops designed to improve teaching performance. Among the anticipated characteristics of effective workshops are: preset outcomes, individual preparation and involvement, brevity, follow-up activity, and participant evaluation. Due to the absence of research on such efforts, however, it is uncertain whether these activities achieve their goals or whether they bring about any positive change in the behaviour of individuals participating in them. But until a higher degree of certainty is achieved, such a context can provide a medium for interchange about the problems of teaching and discussions about possible avenues for its improvement. The promotion of this sort of activity should be one of the major projects of teaching / learning committees and instructional development programs everywhere.

J.B. Hartman

LAPRISE... *from p. 15*

positive effect on our economy. We could also talk about the hiring of more personnel in research laboratories and companies manufacturing products already in use.

From the medical point of view, it is recognised that healthy citizens are more productive in their type of activities. Finally, only research and the spin-offs derived from it can resolve such current problems as unemployment, inflation, the control of the 200 mile sea limit of Canada and the protection of the environment.

4. I think that the best way to transfer technology from universities to the industrial sector is through industrial research contracts for the universities. Universities already having attained advanced technology in a certain category are best qualified to apply the knowledge obtained to the problems found in the industrial sector. For the public sector, the federal government should allow projective research in the form of contracts to the universities and conserve only biomedical research.

5. If we consider the supplementary duty for exemptions that the Minister of Finance, Mr. Chrétien, allows to companies investing in research and development in the budget of April 10th, 1978, comparable financial advantages for universities should also be considered.

For the transfer of technology we would integrate the university sector into the industrial and the governmental sectors by obtaining contracts, so that the insignificant politicians that we have would not be able to brandish the legend of basic research versus applied research, and to manipulate the universities budgets, taking from one to give to the other, to finally come up with no concrete solution.

6. National priorities can be clearly defined in the sectors where research can be done, but I am not convinced that we have to establish a policy for basic and applied research. This categorization in research makes sense only to bureaucrats. I think that scientific research yields fruit which must ripen for a long time before being harvested.

A more likely problem is to determine where the "basic research" ends and where the applied research begins. The inability of government servants to realize the continuity of the process for scientific research is the main factor contributing to keeping people from understanding this subject, which is a part of their everyday lives. In my opinion, research requires a certain time to mature and this cannot be shortened by giving larger grants for applied research. The failure of the United States to fight against cancer, when the fundamental principals were not understood, is evidence of this. The human and material capital wasted in such a failure probably affected the cancer researchers far more than anything else.

7. On the 15th of March 1978, the members of the Social Credit Party of Canada met at the National Council meeting in Winnipeg, and unanimously passed this measure, among others. Long-term funding projections is a measure which is fully integrated into our Party's electoral program. We believe that such long-term policy is imperative. First, because the training of personnel and the purchasing of scientific material must involve long-term planning and second because of the requested time and the large amount of capital invested in research projects. Also, this will have the effect of protecting our research potential from incompetent bureaucrats and from narrow-minded politicians, who once again have been cutting the funds of our university researchers to heal inflation. If the previous governments would have spent as much time trying to realize the proposition of Senator Lamontagne, as they spent trying to reduce the importance of basic research and particularly university research, we would not be behind and dependent upon all the other industrialized nations in the field of research.

8. It is evident that with the approach of the general election and with the number of unemployed persons — now over one million — such propositions coming from the Minister will bring him into favour with the industries and the public. But the Minister is silent on the subject of medical research, which depends most strongly on hospitals and universities. Has the Minister forgotten that citizens in good health are an important asset to our industrial growth? Also, the Minister seems to forget about research that is done in the forest, in the food production field and in other areas by governmental laboratories.

In the field of energy, since 1974, there have been complaints from the Government about our exclusive reliance upon the oil industry companies: isn't this a good occasion to use government and university researchers for starting selective projects?

9. The recent nominations of Mssrs André Fortier and Gordon MacNabb, two public servants withouts any experience in research, confirm once more that the promises made by M.P.s and ministers of the Trudeau government were only to calm down the members of the Canadian scientific community during the meetings they had during the last 18 months. Once again it is not progressive policies but more patronage which keeps the present government in place. With regard to the question of consultation, the Social Credit Party of Canada passed a resolution at its recent National Council meeting, to undertake "to admit the presence of representatives, chosen by the scientific community on government organizations and committees, disposing of budgets, determining priorities, and consulted while realization of long term policies and also for the establishment of future projections once these policies are established." This resolution is henceforth part of our electoral program. By adopting such a resolution, the members of the S.C.P. of Canada were fully conscious of the fact that representatives of the scientific community would surely put the interest of science and the country before the interest of the party, which could bring our defeat in a short time if we failed to respect our engagements. This is the only type of electoral promise that is acceptable in a party such as ours. I also hope that the members of the Canadian scientific community will have the courage of their convictions and that they will join our party to help us fight and support the cause of "Canadian Researchers". This would be more efficient, and surely less protracted, than trying to find a person who would be able to convince the Trudeau government representatives.

10. Even if the Trudeau government has done everything to make believe that the Canadian scientific community is a group of persons always complaining with everything in their hands, I think that its failure in this field, which is known by a lot of people, will have to be explained to the Canadian citizens.

The average age for University teachers is increasing. Given our 8th place position among the industrialized nations in the field of research and development, the non-competitiveness of our products on the international market, and our incapacity for finding solutions to our current problems such as inflation, unemployment and others, this makes it important for the Social Credit Party of Canada to explain the reforms and propositions already mentioned and to put them into effect as soon as possible — before we have reached to point of no return.

11. Where possible, I believe that Canadian researchers should attend the public meetings of all the different political parties and ask them exactly what their positions concerning scientific policies are. Also, it would be the right time to ask the Members of Parliament, and especially the Liberal ministers, who, for almost eight years and with full knowledge of the facts, (Senator Lamontagne's report) have usually acted as catalysts for the deterioration of research in Canada.

HOWIE... *from p. 14*

due to the abrogation by the government of its responsibilities for the creation of a positive environment. What are needed are programs of incentives which take into account the unusual branch-plant structure of our economy and a government willing to implement them.

9. It is indeed disappointing that the government missed the opportunity to allow the Scientific Community to nominate appointments to these bodies. Reneging previously held commitments is inexcusable.

10. Insofar as the need for a fundamental economic reconstructions in this country is the central economic issue, the government's dismal performance in the R & D area must be a great importance.

11. I believe that if individuals are really serious about changing the face of R & D in Canada, they must now realize that only the political option is left open. The Progressive Conservatives are committed to moving Canadian science into the 1980s. Only support for the PC candidate in your constituency can bring the change in R & D policy that not only you, but all Canadians need as a matter of urgency.

WINNING... *from p.7*

soon finds this quite untrue, and discovers that classes with few students are a function of ineffective and unprepared lessons. This then is the prime strategy for the effective player... ineffective teaching. This all leads to more claw-time which is most important to the development of the opening moves of the game.

As you can see, the strategies and tactics involved are both complex and extensive. Since this introduction has hardly scratched the surface, a course will be offered to pre and in-service professors to provide an indepth study of the subject. The course will require extensive reading and library research of the materials and its related areas. Group discussions regarding the review of films, tapes and cassettes will be held with the assigned GA. Consultation with the professor by appointment only. Office hours: 7:30-8:30 A.M. and 12:00-1:00 P.M., Sundays.

Professor Sipser teaches secondary education at the Oswego College of Arts and Science, State University of New York.

Researcher — Part-time Lecturer

CELTIC STUDIES AND SCOTS GAELIC

The College of Cape Breton is seeking to fill a permanent position of RESEARCHER - PART-TIME LECTURER in areas related to CELTIC STUDIES and SCOTS GAELIC. The research function will be carried out under the supervision of the Director of the Beaton Institute of Cape Breton Studies.

The incumbent shall be required to teach one 6-credit university level course in SCOTS GAELIC, and another in Celtic History.

Minimum qualifications include a Masters Degree or equivalent in Scots Gaelic and Celtic Studies. Also required - post-secondary experience in teaching and research in Scots Gaelic and in Language Communications. The position requires the incumbent to be proficient as well in the spoken Scots Gaelic.

Relevant experience shall include post-secondary instruction, research in Scots Gaelic and Celtic Studies, and development of appropriate teaching methodology for modern language instruction and public communications.

Curriculum Vitae should include the above and should be supplemented by additional evidence of scholarly publications in Scots Gaelic.

Salary $12,000-$16,000, commensurate with experience. Address all applications and inquiries for more information to:

Dr. R. Morgan
Director, Beaton Institute
College of Cape Breton
P.O. Box 760
SYDNEY, Nova Scotia
B1P 6J1

Applications will be accepted until June 15, 1978.

Vacancies Postes vacants

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Due to the increase in printing costs, beginning with the September 1978 issue of the **CAUT Bulletin**, advertising rates for Bulletin vacancy (classified) advertisements will be increased from $1.50 per column line of type to $1.65.

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full page	$600.00
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ADMINISTRATION

THE UNIVERSITY OF ALBERTA. **Department of Physical Therapy.** Applications are invited from Physical Therapists for a continuing position as Director of Research in the Department of Physical Therapy. Duties will include teaching of research methods courses at undergraduate and graduate levels, the further development of research facilities, and provision of a research consultation service to faculty, students, and clinicians. Ph.D. desirable; sound record of publications essential. Salary commensurate with qualifications and experience; it is expected that the appointment will be made at the Associate Professor level. The position becomes available on 1st January 1979. Curriculum vitae and the names of three referees should be submitted before 1st September 1978 to: B. Pickles, Chairman, Department of Physical Therapy, Faculty of Rehabilitation Medicine, University of Alberta, Edmonton, Alberta, Canada T6G 2G4.

ATHABASCA UNIVERSITY. **Humanities.** Co-Ordinator. Specialist in Canadian History with strong qualifications in intellectual History / Philosophy. This person will develop and co-ordinate Canadian History courses and possibly a Renaissance course and assist with the supervision of instructor-delivered History and Philosophy courses. Knowledge of French is an asset. Qualifications are Ph.D. or equivalent in History with teaching and writing experience. A strong interest in the adult learner and distance education. Starting date of June 15 or as soon as possible thereafter. Salary range depending on qualifications: $18,084 to $24,000. Letters of application and vitae must be received by 4 p.m. on the 15th of May, 1978. Address applications to: Administrative Co-Ordinator, Personnel Services, Athabasca University, 14515 — 122 Avenue, Edmonton, Alberta T5L 2W4. Athabasca University is an open university chartered by the government of Alberta to provide learning services to adult citizens of Alberta through a diversified delivery system including opportunities for home-base study and distance education.

MOUNT SAINT VINCENT UNIVERSITY. **Department of Education.** (Child Study) Applications are invited for the position of Supervisor of the Mount Saint Vincent University Child Study Centre. Candidates should have a Masters degree in Early Childhood Education or equivalent. Two-thirds time will be spent supervising the Centre and its staff, as well as teaching one full course in the Child Study Department. Duties at the Child Study Centre include programming, budgeting, directing staff, directing practicum for Child Study students, parent meetings, as well as other administrative responsibilities of running a child study centre. Salary in accordance with qualifications and experience. Send curriculum vitae and names of three references to Dr. Marjorie Cook, Chairperson, Department of Education, Mount Saint Vincent University, Halifax, Nova Scotia.

MOUNT SAINT VINCENT UNIVERSITY. **Education Department.** Child Study. Applications are invited for the position of Director of Child Study, Mount St. Vincent University, Halifax, Applicants should hold a Ph.D. and have had experience in teaching, administration and research. The department offers an undergraduate degree and a two-year certificate program in Child Study. Salary to be negotiated. Applications accompanied by curriculum vitae, and the names and addresses of three referees should be sent to Dr. Marjorie A. Cook, Chairman, Education Department, Mount St. Vincent University, Halifax, N.S. B3M 2J6. Duties to commence July 1, 1978. When position filled.

ONTARIO CRIPPLED CHILDREN'S CENTRE. **Director of Rehabilitation Engineering.** The Ontario Crippled Children's Centre is a leading Paediactric Rehabilitation Centre providing an exciting range of services and professional competence. The Director of Rehabilitation Engineering will direct and stimulate a staff of thirty, combining both an orthotic and myoelectric service program for handicapped children and a wide range of research projects. The Director will also have a unique and challenging role in representing the Centre at scientific conferences, preparing papers and developing future direction of research programs. This position requires proven research experience and broad competence in directing a team effort. Obtaining and allocating research grants is part of the task, as is compatibility with people at all levels. Career Resumés should be directed to: Mr. David H. Martin, Secretary, Search Committee, Ontario Crippled Children's Centre, 350 Rumsey Road, Toronto, Ont. M4G 1R8. Closing date June 30, 1978.

QUEEN'S UNIVERSITY. **Faculty of Medicine. Department of Pathology.** Applications are invited for the position of Head, Department of Pathology, Queen's University. Responsible for leadership and supervision of academic and professional activities of the Department of Pathology. The applicant must have demonstrated competence in teaching, research and administration. The position will be filled July 1, 1979 at a salary commensurate with qualifications and experience. Write to Dr. T. J. Boag, Dean, Faculty of Medicine, Queen's University, Kingston, Ontario, K7L 3N6.

UNIVERSITY OF TORONTO. **Department of Family and Community Medicine.** Medical Director — Flemingdon Health Centre. A certified family physician is required to provide leadership in patient care, health care delivery, teaching and research on or about July 1978. Helpful staff includes a professional health administrator. This modern community health centre is a major family medicine teaching resource of the University of Toronto, University fringe benefits and senior rank accompany this appointment. Apply to: Dr. D. H. Johnson, Chairman, Search Committee Head, Department of Family and Community Medicine.

THE UNIVERSITY OF WESTERN ONTARIO. **Department of Secretarial and Administrative Studies.** Nominations and applications are invited for the position of Chairman of the Department of Secretariat and Administrative Studies, Faculty of Social Science, effective January 1, 1979. A Senate Selection Committee recommends an appointment for a three to five-year term, renewable. Nominations and applications should be sent to the Chairman of the Selection Committee, Professor B. Kymlicka, Dean, Faculty of Social Science, Social Science Centre, The University of Western Ontario, London, Ontario N6A 5C2. The deadline for submission is May 15, 1978.

YORK UNIVERSITY. **Faculty of Arts.** Writing Workshop, budget permitting. Position: Assistant Director, full-time, one-year. Approximately $12,000. Duties include coordinating individual tutoring programme and classes, tutoring, and working closely with Director in administering Workshop. Several years' experience teaching writing one-to-one required. Experience with functional approaches to teaching language to first and second language students an asset. M.A. in Humanities of Social Sciences required. Familiarity with Workshop programme, York General Education programme, and Faculty departmental courses an asset. Apply, Director, Writing Workshop, Faculty of Arts, Ross Bldg., S713, York University, 4700 Keele St., Downsview, Ontario, M3J 1P3, before May 15, 1978.

ACCOUNTING

UNIVERSITY OF WATERLOO. **Accounting.** Applications are invited for continuing or visiting appointments in Accounting, subject to budget approval. Rank and salary are dependent upon professional and academic qualifications and experience. Doctorate completed or near completed or research record required for senior position; other applications also invited for position as Lecturer or Assistant Professor. Please send resume to Dr. J. H. Hotson Chairman, Department of Economics, University of Waterloo, Waterloo, Ontario N2L 3G1. Commencing September 1, 1978. Closing date for receipt of applications June 30, 1978. First consideration will be given to those applicants who at the time of application are legally eligible to work in Canada for the period covered by this position.

AGRICULTURAL ECONOMICS

UNIVERSITY OF SASKATCHEWAN. **Department of Agricultural Economics.** Regional and Rural Development. Title of Position: Assistant Professor of Agricultural Economics. Location: Department of Agricultural Economics, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, S7N 0W0. Major Responsibilities: 1. Teaching undergraduate and graduate level courses in Agricultural Economics with emphasis on those relating to Agricultural Development at the Regional and Local level. 2. Developing and conducting a research program with emphasis in the same area. 3. Undertaking Extension activity that is complementary to research and teaching in regional and rural development. Qualifications: Ph.D. in Agricultural Economics with a major in Regional and / or Rural Development. Strong minors in Quantitative Methods and General Agricultural Economics would be desirable. Rank and Salary: The initial appointment will be made as Assistant Professor in accordance with a salary scale now under negotiation. Date Position Open: July 1, 1978. General Information: The Department of Agricultural Economics at the University of Saskatchewan has a teaching program which covers the Vocational, Bachelor and Master of Science level. It has an ongoing research program as well as a small extension program. The University is well served with library and computer facilities. It contains a broad range of Degree granting Colleges, and maintains an enrolment in excess of 10,000 students. Applications: Interested candidates should apply with detailed curriculum vitae, transcripts, and names and addresses of three referees to: Dr. George E. Lee, Professor and Head, Department of Agricultural Economics, University of Saskatchewan, 328 Kirk Hall, Saskatoon, Saskatchewan, Canada, S7N 0W0. Applications will be accepted until the position is filled.

UNIVERSITY OF SASKATCHEWAN. **Department of Agricultural Economics.** Title of Position: Assistant Professor of Agricultural Economics. Location: This is a joint position in the Department of Agricultural Economics, and The School of Agriculture, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, S7N 0W0. Major Responsibilities: 1. Teaching Farm Business Management especially at the Vocational Agriculture level in the School of Agriculture. Some teaching at the BSA undergraduate level may also be required. 2. Developing and conducting a research program that will assist in coordinating Animal, Crop, Soil and Business Management into the Department's instructional program. 3. Conduct research on specific areas of the substance of Farm Business Management. 4. Engage in Extension activities to the extent that the above teaching and research roles are facilitated. Qualifications: An undergraduate degree in agriculture and Post Graduate training in Farm Business Management at the M.Sc. or Ph.D. level. Rank and Salary: The appointment will be at the Assistant Professor level in accordance with a scale now under negotiation. Date Position Open: July 1, 1978. General Information: The Department of Agricultural Economics at the University of Saskatchewan has a teaching program at the Vocational, Bachelor and Master of Science levels. It has an ongoing research and extension program. The School of Agriculture is a vocational (2 year) program leading to a Diploma in Agriculture. The School has an enrolment of approximately 200 in the first year and 120 in the second. Farm Business Management and related subjects comprise a major component in both years of study. Applications: Interested candidates should apply with detailed curriculum vitae, transcripts, and names and addresses of three referees to: Dr. George E. Lee, Professor and Head, Department of Agricultural Economics, University of Saskatchewan, 328 Kirk Hall, Saskatoon, Saskatchewan, Canada, S7N 0W0. Applications will be accepted until the position is filled.

ANIMAL & POULTRY SCIENCE

UNIVERSITY OF GUELPH. **Department of Animal & Poultry Science.** Assistant Professor - Contractual Terms. The Department of Animal and Poultry Science, University of Guelph, requires an Assistant Professor under contractual terms with Ph.D. qualifications to teach and conduct research with emphasis in poultry and swine production. Filling this position is subject to continuing availability of funds. Candidates should submit their curriculum vitae before May 31, 1978 to W.D. Morrison, Professor and Chairman, Department of Animal & Poultry Science, Ontario Agricultural College, University of Guelph, Guelph, Ontario N1G 2W1 (519-824-4120 Ext. 2251).

ARCHITECTURE

NOVA SCOTIA TECHNICAL COLLEGE. **School of Architecture.** This university faculty of architecture, which presently comprises a School of Architecture and a

Department of Urban and Rural Planning, seeks applications from highly-qualified teachers possessing significant experience for appointment to three positions. Applications will be especially welcomed from those able to contribute to the Faculty's teaching and research in: Design method and communication (design theory, computer applications) Building environment (integrated studies of the thermal environment, lighting and acoustics); Principles of Building Construction Planning. The Faculty would expect these new teachers to contribute an understanding of their particular subject to Design and, reciprocally, an awareness of Design to their subject. In the first instance, interested persons are invited to send a resume that includes a statement of teaching interests and indication of availability to: Dr Peter Manning, Dean, Faculty of Architecture, Nova Scotia Technical College, P.O. Box 1000, Halifax, Nova Scotia, Canada B3J 2X4.

UNIVERSITY OF TORONTO. **School of Architecture.** Full-time staff position in the School of Architecture with a central responsibility to develop and teach the history component of the curriculum in a five-year undergraduate programme. To participate in the core problems as an architectural design tutor and to formulate courses in architectural theory and history. Breadth of interest and background essential. Qualifications: B. Arch. or M. Arch; M.A. or Ph.D. in Architectural History / Theory; previous teaching experience. Apply including curriculum vitae, statement of interests and two letters of recommendation to: Professor Blanche Lemco van Ginkel, Director, School of Architecture, University of Toronto, 230 College Street, Toronto, Ontario M5S 1A1. Deadline for receipt of applications: July 15, 1978.

BIOCHEMISTRY

UNIVERSITÉ LAVAL. **Department of Biochemistry.** Microbiology. Department of Biochemistry, responsible for undergraduate programs in Microbiology and Biochemistry, anticipates the need for staff capable of teaching in one or more of the following areas; virology, microbial genetics; immunology and serology. Candidates will be expected to show evidence of an appropriate background in one of these areas and, in addition, will be required to describe a program of research, related or not to essential teaching responsibilities. Letters of inquiry should include a curriculum vitae, statements of teaching capacities and research interests, three letters of recommendation and reprints. Dr. Jean-Louis Lavoie, Directeur, Département de Biochimie, Faculté des Sciences et de Génie, University Laval, Québec, Québec, G1K 7P4 Canada. Actual or eventual fluency in french is required of all candidates. Actual salary range for assistant professor Can. $19,000.-$31,000.

THE UNIVERSITY OF WESTERN ONTARIO. **Department of Biochemistry.** A postdoctoral position will become available in the Department of Biochemistry on July 1, 1978. The applicant must have a Ph.D. with previous training in lipid or membrane biochemistry, physical biochemistry or enzymology. Salary will be $12,000. per annum. The deadline for application is May 15, 1978. Applications, together with curriculum vitae and two references, are to be sent to the Secretary, Department of Biochemistry, University of Western Ontario, London, Canada N6A 5C1.

BIOLOGY

CONCORDIA UNIVERSITY. **Department of Biology.** Applications are invited for a tenure stream position at the rank of Assistant or Associate Professor and a leave replacement position at the Assistant Professor level in cell biology, microbiology or ecology. The candidates for both positions must have the Ph.D. degree and relevant research and teaching experience in one of the specified areas. The successful candidate for the on-going position will be expected to establish an independent research programme and teach at the graduate and undergraduate level in the area of specialization. Salaries commensurate with qualifications and experience. (Current salary floor for Assistant Professor $18,000, Associate Professor $23,000.). Applicants should send a recent curriculum vitae and the names of three referees to Dr. R.M. Roy, Chairman, Department of Biology, Concordia University, 1455 de Maisonneuve Blvd. W., Montreal, Quebec. H3G 1M8.

UNIVERSITY OF SASKATCHEWAN. **Department of Biology.** Postdoctoral with competence in some phase of sediment core studies; cooperative study of lake history and past rates of eutrophication; salary $10,000 per annum initially; curriculum vitae with three references; starting date negotiable. Dr. U. T. Hammer, Department of Biology, University of Saskatchewan, Saskatoon. S7N 0W0.

UNIVERSITY OF WATERLOO. **Department of Biology.** Applications are being accepted for the position of Invertebrate Zoologist: sabbatical replacement for the 1978/79 academic year. Teach two one-semester courses, elementary invertebrate zoology and arthropod zoology, and assist with course in biology of the sea for non-majors. Full time or part time appointment as visiting professor or as teaching PDF. Salary and terms of appointment to be negotiated. Ph.D. in Biology/Zoology. Previous university teaching experience an advantage. Send applications to Dr. J. K. Morton, Chairman, Department of Biology, University of Waterloo, Waterloo, Ontario N2L 3G1 before 30 May 1978. Appointment effective 1 September 1978. (Subject to the availability of funds). Applicants should be legally eligible to work in Canada for the period covered by this position.

UNIVERSITY OF WATERLOO. **Department of Biology.** Applications are being accepted for the position of Assistant Professor in microbiology. Ph.D. required; post-doctoral experience preferred. Duties: to teach undergraduate virology and general microbiology and to establish an independent research program in some area of microbiology. Salary commensurate with qualifications. Initial 2-year term appointment. Send curriculum vitae and names of three referees to Dr. J. K. Morton, Chairman, Department of Biology, University of Waterloo, Waterloo, Ontario N2L 3G1. Effective date of appointment is July 1, 1978. Closing date for receipt of applications is when the position is filled. (Subject to the availability of funds.) Applicants should be legally eligible to work in Canada for the period covered by this position.

UNIVERSITY OF WINDSOR. **Department of Biology.** The Department of Biology, University of Windsor, invites applications for a position in animal physiological ecology (subject to budgetary approval) at the rank of Assistant Professor (salary floor, 1978-79, $17,917) for the 1978-79 academic year. The successful candidate will be exchanged to teach comparative physiology and share teaching responsibilities in human physiology. In addition, the appointee will develop a program of independent research and graduate student supervision in the physiology of animal adaptations and or behaviour. Send curriculum vitae, the names of three references, and a statement of research interests to: Dr. H. D. McCurdy, Professor and Head, Department of Biology, University of Windsor, Windsor, Ontario. N9B 3P4. Canada.

THE UNIVERSITY OF WINNIPEG. **Department of Biology.** Applications are invited from Vertebrate Physiologists for a sessional appointment at the level of Instructor. Minimum qualification M.Sc. Duties will include running laboratory classes in Comparative Chordate Anatomy, Animal Physiology and Human Physiology. Salary dependent on qualifications and experience. Send curriculum vitae and names of three references to: Dr. R. A. Woods, Chairman, Department of Biology, University of Winnipeg, Winnipeg, Manitoba, R3B 2E9. Applications should be received no later than May 15th, 1978. Starting date September 1st, 1978.

THE UNIVERSITY OF WINNIPEG. **Department of Biology.** Applications are invited from Microbiologists for a sessional appointment at the level at Assistant Professor. Candidates should have a Ph.D teaching experience would be advantageous. Duties will include teaching a full course in General Microbiology. Salary dependent on qualifications and experience. Starting date September 1st, 1978. Send curriculum vitae and the names of three references to: Dr. R. A. Woods, Chairman, Department of Biology, The University of Winnipeg, Winnipeg, Manitoba, R3B 2E9. Applications should be received not later than May 15th, 1978.

THE UNIVERSITY OF WINNIPEG. **Department of Biology.** Applications are invited for a position as Research Associate to work on the biochemical genetics of sterol mutants of yeast. Ph.D. and some experience preferred. Available for 1 year. Salary $11,000. Resumé and three references to: Dr. R. A. Woods, Department of Biology, University of Winnipeg, Winnipeg, Manitoba. R3B 2E9.

BUSINESS ADMINISTRATION & COMMERCE

THE UNIVERSITY OF ALBERTA. **Faculty of Business Administration and Commerce,** requires sessional lecturers to teach basic undergraduate courses in: Business Economics, Finance, Industrial Relations, Labour Law, Operations Research, Taxation. Qualifications: Appropriate Masters degree; C.A. for Taxation courses; LL.B. for Labour Law courses. Some teaching experience preferred. The University of Alberta is an equal opportunity employer. Term: September 1 — December 31, 1978 and / or January 1 — April 30, 1979. Salary: Commensurate with qualifications and experience. Apply to: Dr. D. Gordon Tyndall, Acting Dean, Faculty of Business Administration and Commerce, University of Alberta, Central Academic Building, Room 399C, Edmonton, Alberta, T6G 2G1.

THE UNIVERSITY OF ALBERTA. **Faculty of Business Administration and Commerce.** Applications are invited for six (6) faculty positions. Teaching and research interests should be in business policy, organization theory, finance, management science, accouting or industrial relations. Ph.D. or equivalent is desirable. Both men and women are invited to apply. Salary and rank depend on qualifications. Applications welcome until positions are filled. Appointments, normally effective July 1. Send resume to: Dr. D. Gordon Tyndall, Acting Dean, Faculty of Business Administration and Commerce, University of Alberta, Edmonton, Alberta, T6G 2G1.

THE UNIVERSITY OF ALBERTA. **Faculty of Business Administration and Commerce.** Applications are invited from individuals who would be interested in a visiting appointment in the Faculty of Commerce, University of Nairobi, Nairobi, Kenya. Successful candidates will assume a leadership and training role in developing an indigenous faculty and will hold a Ph.D. with extensive teaching and research experience. Teaching and research interests should be in accouting, management science, organizational behavior, or finance. Overseas experience would also be an advantage. Remuneration will be at the level of current Canadian salary, plus overseas allowance, housing, education allowance, return transportation, shipment of personal effects and storage of goods left in Canada. Apply in writing to Dr. John L. Brown, Faculty of Business Administration and Commerce, University of Alberta, Edmonton, Alberta T6G 2G1.

ALGOMA UNIVERSITY COLLEGE. **Department of Commerce and Administration.** Possible full-time contractually limited, appointment in Commerce and Administration commencing July 1, 1978. Applicants should have M.B.A., C.A., and / or Ph.D., or D.B.A. Subject areas to include upper level undergraduate accounting courses, Marketing Management, Business Finance, Business Organization and Management. Other areas such as Business Policy and Personnel will be consedered. Rank and salary open and competitive. Application, official transcripts and curriculum vitae should be accompanied by the names of three references, and forwarded to Professor Donald A. Jackson, Acting Chairman, Social Sciences Division, Algama University College, Sault Ste. Marie, Ontario.

BROCK UNIVERSITY. **School of Administrative Studies.** Applications are invited for two new teaching positions. Candidates should have competence in either Finance of General Management. A Ph.D., a Ph.D. in progress, or the equivalent is required. Salary and rank are dependent on qualifications and experience. An application, including a curriculum vitae and the names of three referees, should be submitted to: Dr. K. Kernaghan, Director, School of Administrative Studies, Brock University, St. Catharines, Ontario, L2S 3A1.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Accounting. A doctorate degree or a dissertation near completion is required. Duties involve undergraduate and graduate teaching and research. Rank and salary based on experience. Appointments effective July 1, 1978. Direct all inquiries to Dr. C.A. Prentice, Chairman, Accounting Area, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** The University of Calgary, Faculty of Business is seeking qualified candidates to fill positions in all areas including Accounting, Policy & Environment, Finance, Management Science & Management Information Systems and Marketing, beginning July 1, 1978. Ph.D. or D.B.A. preferred. Rank and salary based on qualifications and experience. Applications should be addressed to: Dr. George S. Lane, Dean, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Finance. A doctorate degree or dissertation near completion is required. Duties involve undergraduate and graduate teaching and research. Rank and salary based on experience. Appointments effective July 1, 1978. Direct all inquiries to Dr. Edmund G. Sugars, Chairman, Financial Management Area, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Management Information Systems. A doctorate degree or dissertation near completion required. Duties involve undergraduate and graduate teaching and research. Rank and salary based on experience. Appointments effective July 1, 1978. Direct all inquiries to Dr. Malcolm C. Munro, Chairman, Management Science and Information Systems Area, Faculty of Business, The University of Calgary, Calgary, Alberta T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Marketing. A doctorate degree, teaching experience, and strong research potential are required. Rank and salary are open and competitive. Direct all inquiries to Dr. Everett E. Johnston, Chairman, Marketing Area, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Business Policy. An advanced degree is required. Considerable business or government experience is very desirable. Ability to teach Introduction to Business, Business strategy, Business Communications, or Public Administration is a definite plus. Duties involve undergraduate and graduate teaching and research. Rank and salary are based on qualifications and experience. Appointments effective July 1, 1978. Direct all inquiries to Dr. Edmund G. Sugars, Chairman, Policy & Environment Area, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Business Law. Qualifications required are a law degree and / or an M.B.A. Considerable experience is helpful. Duties involve undergraduate and graduate teaching and research. Rank and salary are based on qualifications and experience. Appointments effective July 1, 1978. Direct all inquiries to Dr. Edmund G. Sugars, Chairman, Policy & Environment Area, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Business Communications (written and oral). Considerable business, government, or teaching experience is very desirable. Duties involve undergraduate teaching and the future possibilities of graduate teaching and research. Rank and salary are based on qualifications and experience. Appointments effective July 1, 1978. Direct all inquiries to Dr. Edmund G. Sugars, Chairman, Policy & Environment Area, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

UNIVERSITY OF CALGARY. **Faculty of Business.** Applications are invited for academic positions in Organization Theory, Labor Relations or Public Management. A doctorate degree, teaching experience, and strong research potential are required. Rank and salary are open and competitive. Direct inquiries to Dr. Ahmed N. Azim, Chairman, Management Area, Faculty of Business, The University of Calgary, Calgary, Alberta, T2N 1N4.

ROYAL MILITARY COLLEGE OF CANADA. **Commerce.** Département de sciences économiques et politiques. Le département de sciences économiques et politiques offre un poste à terme en commerce. La grade dépendra des qualifications et de l'expérience. Le doctorat avec spécialisation en finance est

préféré. Les candidats détenant un MBA seront sérieusement considérés. Enseigner en français au premier cycle des cours de comptabilité et de gestion. La connaissance des deux langues officielles est requise. Le salaire dépendra des qualifications et de l'expérience. Faire parvenir son curriculum vitae au Dr. Pierre Bussières, Assistant au principal, Royal Military College of Canada, Kingston K7L 2W3, Ontario. Date de nomination: 1er juillet 1978. Ouvert.

ROYAL MILITARY COLLEGE OF CANADA. **Département de sciences économiques et politiques.** Le département de sciences économiques et politiques offre un poste à terme en science économiques. Le grade dépendra des qualifications et de l'expérience. Le doctorat est préféré. Enseigner en français au premier cycle. La connaissance des deux langues officielles est requise. Le salaire dépendra des qualifications et de l'expérience. Faire parvenir son curriculum vitae au Dr. Pierre Bussières, Assistant au principal, Royal Military College of Canada, Kingston K7L 2W3, Ontario. Date de nomination: 1er juillet 1978. Ouvert.

ST FRANCIS XAVIER UNIVERSITY. **Department of Business Administration.** Applications are invited for the following undergraduate teaching positions: Business Policy, Finance, Production / Operations Management and General Management. Ph.D. or Ph.D. candidate or equivalent. Rank and salary dependent on qualifications and experience. Direct replies to L. T. Gallant, Chairman, Department of Business Administration, St. Francis Xavier University, Antigonish, Nova Scotia B2G 1C0. Appointment effective Fall 1978.

YORK UNIVERSITY. **Faculty of Administrative Studies.** Positions open commencing July 1, 1978 in the following areas subject to budget approval: Operations Management, Information Systems, and Business Policy. Rank and salary are open. Successful candidates will be expected to be active in research and to teach in the Ph.D., Masters, and Undergraduate Programmes. Please submit curriculum vitae and references to W. B. Crowston, Dean, Faculty of Administrative Studies, York University, 4700 Keele Street, Downsview, Ontario, M3J 2R6. Deadline for submission — when positions are filled.

CHEMISTRY

ACADIA UNIVERSITY. **Department of Chemistry.** Biochemistry. Applications are invited for a sessional appointment to teach the Biochemistry courses currently offered by the Chemistry Department. Applicants should have a Ph.D. in biochemistry or chemistry. Preference will be given to the applicant with teaching and research experience in biochemistry. Salary $13,000 for the eight month period September 1, 1978 to April 30, 1979. Applications will be accepted until the position is filled. Applications, including curriculum vitae and names of three referees should be sent to: Dr. E. R. Hayes, Chairman, Selection Committee, Department of Chemistry, Acadia University, Wolfville, N.S. B0P 1X0.

THE UNIVERSITY OF NEW BRUNSWICK. **Department of Chemistry.** Postdoctoral Fellow. Studies of gas phase ion-molecule reactions by ion cycloron resonance spectroscopy. Stipend from $10,800 to $11,100. Send curriculum vitae and arrange for two letters of reference to be sent to: T.B. McMahon, Department of Chemistry, University of New Brunswick, P.O. Box 4400, Frederiction. N.B. Canada E3B 5A3.

THE UNIVERSITY OF NEW BRUNSWICK. **Department of Chemistry.** Applications are invited for the position of Assistant Professor in Inorganic Chemistry (subject to budgetary approval). The applicant should be prepared to pursue an active research and teaching program. While applications from all highly qualified candidates are welcome, some preference will be given to those who complement the preparative areas presently well represented in the Department. The appointment will date from July 1, or September 1, 1978, and applications should be sent to: Professor F. Grein, Chairman, Department of Chemistry, University of New Brunswick, Box 4400, Fredericton, N.B., Canada E3B 5A3.

UNIVERSITY OF TORONTO. **Department of Chemistry.** Postdoctoral Fellowship Position. A postdoctoral position is available in the area of physical-organic chemistry. The project will involve mainly kinetic and labelling studies. Stipends range from $10,080-$11,100 per annum. Starting date: summer / fall 1978. Send curriculum vitae and names of three referees to: Dr. R.A. McClelland, Department of Chemistry, University of Toronto, Toronto, Ontario, Canada M5S 1A1.

UNIVERSITY OF TORONTO. SCARBOROUGH COLLEGE. **Department of Chemistry.** Demonstratorship, full-time sessional appointment beginning September 1st, 1978. Duties include laboratory demonstrating, conducting tutorials, and grading, and introductory and intermediate level chemistry courses. Applications including names of three referees to: Professor John E. Dove, Chairman, Physical Sciences Group. Scarborough College, University of Toronto, West Hill, Ontario, M1C 1A4, Canada.

UNIVERSITY OF VICTORIA. **Department of Chemistry.** The Department of Chemistry has a vacancy for the 1978/79 session for a third visitor / sessional appointee in addition to those already advertised in inorganic and organic chemistry. The incumbent of the third position may have his area of specialization in polymer chemistry, industrial / environmental chemistry, or analytical chemistry. Details of the teaching required and remuneration will be established on negotiation with the seccessful candidate. Applications with curriculum vitae and the names of three referees, or general enquiries, should be sent to: Dr. A. D. Kirk, Chairman, Department of Chemistry, University of Victoria, Victoria, B.C., Canada, V8W 2Y2. Althouth there is no closing date for applications, it is intended to try and reach a decision by the beginning of May.

CLASSICS

McMASTER UNIVERSITY. **Department of Classics.** (Roman Studies) Post Doctoral Fellow for a one-year contractual appointment. Recent Ph.D. in Classics to continue research appropriate to the interests of the Department, with six units of undergraduate teaching. The Fellowship offers a salary of $11,880 plus $1,000 for teaching a six unit course. Please supply curriculum vitae and names of three referees, with a statement regarding research programme to: The Chairman, Department of Classics, McMaster University, Hamilton, Ontario L8S 4M2. The appointment is effective September 1, 1978.

COMPUTER SCIENCE

THE UNIVERSITY OF MANITOBA. **Department of Computer Science.** The Department of Computer Science invites applications for the position of Assistant Professor effective July 1, 1978. The appointment is subject to budgetary approval and may be term or probationary. The salary will be commensurate with experience and qualifications. Preference will be given to persons able to teach graduate courses in information retrieval and minicomputers. Applications including a curriculum vitae should be addressed to Dr. R.S.D. Thomas, Acting Head, Department of Computer Science, University of Manitoba, Winnipeg, Manitoba R3T 2N2, to be received by July 21st, 1978.

CONSTRUCTION MANAGEMENT

CONCORDIA UNIVERSTIY. **Construction Management.** Positions are available for two candidates in the area of Construction Management for the graduate programme in Building Engineering. Approximately 25 practising engineers and architects and several full-time students are currently enrolled in the Construction Management branch of this programme. The successful candidates will have extensive industry experience in business practices and human factors as they relate to construction, or in construction operations and site management. With respect to the first area, appropriate educational qualifications include a bachelor of engineering and preferably an M.B.A. or M.A.Sc. Candidates for the second area should have an M.A.Sc. and preferably a Ph.D. Duties consist of: Teaching graduate and undergraduate courses in Construction Business Practices, Human Factors in Construction, Project Acquisition and Control and Construction Methods and Equipment Processes; conducting research, supervision of graduate student research and liaison with industry. Salary and rank are negotiable depending on qualifications. Interested candidates should apply in writing to: Dr. Paul Fazio, Director, Centre for Building Studies, Concordia University, 1455 de Maisonneuve Blvd. West, Montreal, Quebec H3G 1M8.

DENTISTRY

McGILL UNIVERSITY. **Faculty of Dentistry.** Full-time position for Periodontist. Candidates must be eligible for licensure by Order of Dentists of Quebec, have a National Dental Examining Board Certificate and be prepared to fulfill French language requirements enabling him / her to teach clinically and enjoy consulting and private practice privileges. Temporary license would be granted in the interim. Academic rank and duties: Assistant Professor to participate in the undergraduate teaching of periodontics; research activities encouraged. Salary commensurate with teaching and clinical experience. Please send curriculum vitae and reference to Dr. R. F. Harvey, Faculty of Dentistry, McGill University, 3640 University Street, Montreal, Quebec. H3A 2B2.

McGILL UNIVERSITY. **Faculty of Dentistry.** Full-time position for an Assistant Professor in Preventive Dentistry. Candidates should possess a D.D.S. or D.M.D. or its equivalent and should have undertaken graduate work in cariology. To take charge of teaching preventive dentistry to undergraduate students as well as to conduct research related to preventive dentistry. Salary commensurate with experience. Applicants must be prepared to meet the requirements for licensure in the Province of Quebec. Position available September 1, 1978. Send curriculum vitae to Dr. J. W. Stamm, Faculty of Dentistry, McGill University, 3640 University Street, Montreal, Canada, H3A 2B2.

EARTH SCIENCE

THE UNIVERSITY OF MANITOBA. **Department of Earth Sciences.** The Department of Earth Sciences invites applications for the position of Assistant Professor effective September 1, 1978. Applicants must have a Ph.D., and must be dedicated to teaching and research excellence in one of the following areas: 1. Engineering Geology. 2. Paleontology. Appropriate experience would be desirable. The appointment is subject to budgetary approval as to both status and rank. The salary will be commensurate with experience and qualifications. Applications including a curriculum vitae and the names of three references should be addressed to: Dr. W.C. Brisbin, Department of Earth Sciences, University of Manitoba, Winnipeg, Manitoba, R3T 2N2, to be received by June 15, 1978.

ECONOMICS

CONCORDIA UNIVERSITY. **Department of Economics.** Possiblity of four appointments at various levels commensurate with candidate's qualifications. Main areas **Economic Development, Public Economics, General Theory,** and **Monetary Economics** with secondary specialization in Labour Economics, Industrial Relations and History. Demonstrated record of high scholarly achievement in terms of publications and recognition in the main area of specialization. Graduate and undergraduate teaching; supervision of Ph.D. dissertations. Salaries are fully competitive. (Salary scale for 1977/78 - Assistant: $18,000; Associate: $23,300; full: $29,800). Forward applications to the Personnel Committee, Department of Economics, Concordia University, Montreal, Quebec, H3G 1M8. Date of appointment - June 1978. Applications accepted until positions are filled.

EDUCATION

CONCORDIA UNIVERSITY. **Department of Education.** Applications are invited for two positions. One for a person with a doctorate in Social Foundations of Education and the other for a person with qualifications and research interests in one or more of Learning and Instructional Design; Development and Evaluation of Educational Materials (e.g. TV, Film Computer-based Systems, Educational Games); Experimental Analysis of Educational Behaviour; Educational Systems Analysis and Planning; Theory of the Moving Image. Rank and Salary negotiable. Please send curriculum vitae together with names of three referees immediately to Dr. J. Bhatnagar, Chairman, Department of Education, Concordia University, 1455 de Maisonneuve Blvd., West, Montreal, Quebec, H3G 1M8.

DALHOUSIE UNIVERSITY. **Department of Education.** The Department of Education at Dalhousie University invites applications for a one year appointment at the Assistant Professor level in the area of language arts education. Duties will include teaching a methods class in this area for students preparing to be elementary teachers, supervision of field experience, and a graduate class in the area of curriculum and language arts. Applicants with Ph.D. preferred plus relevant teaching experience. The appointment will be effective from July 1, 1978. Salary is $15,000. Applicants should submit a detailed curriculum vitae to Dr. W. Hare, Chairman, Department of Education, Dalhousie University, Halifax, Nova Scotia, B3H 3J5.

MEMORIAL UNIVERSITY OF NEWFOUNDLAND. **Faculty of Education.** Division: Vocational Education. Position: Director, Teacher Preparation in Vocational Education. Academic rank according to preparation and experience. Qualifications: Master's degree in vocational education minimum; doctorate or near doctorate in vocational education preferred; business / industrial experience. Nature of Duties: (a) To direct the delivery of a teacher education diploma / degree programme in vocational education and a teacher education diploma programme in industrial arts education. (b) To provide leadership in meeting emerging needs by designing courses in the programmes. (c) To teach courses in the programmes. (d) To establish and maintain liaison with the technical / vocational school system in the Province. (e) To counsel prospective students. Salary: Competitive. Apply to: Mr. B.V. Paddock, Dean, Faculty of Education, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X8. Include curriculum vitae and names of three referees. Effective date of Appointment: 1st September 1978. Deadline for Applications: When position filled.

MOUNT SAINT VINCENT UNIVERSITY. **Education Department.** Assistant or Associate Professor, Department of Education, Mount Saint Vincent University, Halifax, Nova Scotia. Doctorate completed or in progress in reading education. Mount Saint Vincent University has expanded its offerings in graduate reading education with a new Graduate Diploma Program to train reading consultants and supervisors beyond the masters level and is in the process of re-activating its reading-language centre. Duties to include: 1. teaching reading courses at the masters and graduate diploma level 2. supervising theses and projects 3. teaching inservice reading courses 4. teaching reading courses at the B. Ed. level. Applications would be particularly welcome from reading-trained persons who also have expertise in language arts education and/or learning disabilities and experience in school teaching. Salary: dependent on experience and qualification. Starting date: July 1, 1978. Inquiries, credentials and names of two referees to: Dr. Marjorie A. Cook, Chairman, Department of Education, Mount Saint Vincent University, Halifax, N.S. B3M 2J6

MOUNT SAINT VINCENT UNIVERSITY. **Education Department.** 1. Assistant or associate professor. 2. Ph.D. in hand or near completion. 3. Duties to include teaching and the co-ordination and supervision of field experience for undergraduates. 4. Salary commensurate with qualifications. 5. Applications accompanied by curriculum vitae, and the names and addresses of three referees should be sent to Dr. Marjorie A. Cook, Chairman, Education Department, Mount Saint Vincent University, Halifax, N.S. B3M 2J6. 6. Duties to commence on or before September 1, 1978. 7. When position filled.

UNIVERSITÉ LAVAL. **Faculté des sciences de l'éducation.** Département d'administration et politique scolaires. Titre attaché au poste: Adjoint, agrège ou titulaire. Conditions requises: Doctorat ou l'équivalent (histoire ou education). Ces candidats doivent être spécialisés en histoire de l'éducation, spécifiquement au Québec, en éducation comparée et en méthodologie. Fonctions: Enseignement et recherche dans les champs mentionnés. Traitement et conditions de travail: Selon la convention collective. Date d'entrée en fonction: 1er juillet 1978. Faire parvenir le curriculum vitae avant le 15 mai 1978 à: Monsieur Bernard Jasmin, directeur, Département d'administration et politique scolaires, Faculté des sciences de l'éducation, Cité universitaire, Québec, Canada G1K 7P4.

UNIVERSITY OF REGINA. **Faculty of Education.** 1. Title of Position: Special Lecturer (10 month appointment) in Health and Physical Education. 2. Qualifications: At least a Master's degree in Physical Education (doctorate preferred) plus academic training in physical education and one of health, outdoor education or general education, and successful teaching experience at the elementary and/or secondary level. 3. Nature of Duties: Undergraduate teaching in elementary and secondary physical education classes

emphasizing curriculum and teaching methodology. The incumbent will be expected to participate in supervision of students in their practicum as well as assist with the supervision of interns 4 Salary Offered: Salary negotiable according to qualifications and experience. 5. Person to whom Inquiries should be Addressed: Dean W. N. Toombs, Faculty of Education, University of Regina, Regina, Saskatchewan S4S 0A2 6. Effective Date of Appointment: July 1, 1978 or September 1, 1978. 7. Closing Date for Receipt of Applications: When position is filled.

UNIVERSITY OF SASKATCHEWAN. **College of Education.** The College of Education invites applications for a full time position in the Department of Curriculum Studies. Qualifications: Doctorate or near completion of doctoral program; background and training in Curriculum Theory and Curriculum Development, in Program Evaluation and Research Design and experience in the supervision of student teaching. Rank and Salary: Assistant or Associate Professor. Commensurate with experience and qualifications. Closing Date for Applications: When position is filled. Apply to: Dr. J. K. Gajadharsingh, Head, Department of Curriculum Studies, College of Education, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0W0.

ENGINEERING

UNIVERSITY OF SASKATCHEWAN. **Engineering. Department of Agricultural Engineering.** Applications are invited for the position of Assistant Professor, or junior Associate Professor. Qualifications required are a ph.D. or equivalent, and experience in the area of farm structures and environment. Those with training in a related field in engineering and with an agricultural background will be considered. The successful candidate will be required to teach undergraduate and graduate courses and to carry out research in farm structures and environment. The date of the appointment is July 1, 1978 and applications will be accepted until the position is filled. Applications, including curriculum vitae and the names of their references, are to be sent to P.N. Nikiforuk, Dean of Engineering, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0W0.

QUEEN'S UNIVERSITY. **Engineering. Department of Chemical Engineering.** Applications are invited for a position of Assistant Professor. A doctorate in the field is required. In addition to excellent teaching, the appointee will be expected to carry on vigorous and innovative research consonant with the Department's development plans. Prior industrial experience is desirable. All strong candidates will be considered, but those with expertise or interest in any of the following fields may receive preference: transport processes, extractive metallurgy, electrochemical engineering, combustion, fuels, and energy. Starting salary is in the range $17,000 - $23,000, and the earliest starting date is July 1. The position will be open until it is filled. A curriculum vitae, a statement of research and teaching interests, and the names of three references (including the Ph.D. supervisor) should be submitted to: Prof. H.A. Becker, Head, Department of Chemical Engineering, Queen's University, Kingston, Ontario K7L 3N6.

UNIVERSITY OF TORONTO. **Engineering. Department of Chemical Engineering and Applied Chemistry.** Occupational Health Engineering and Industrial Hygiene. Applications are invited for two professorial positions in the Department of Chemical Engineering and Applied Chemistry, University of Toronto. The openings relate directly to an expansion of teaching in the fields of occupational health engineering and industrial hygiene. The expansion is possible as a result of a grant from the Ministry of Labour, Ontario, to the University of Toronto. The Department of Chemical Engineering and Applied Chemistry (in association with other engineering departments) together with the Department of Preventive Medicine and Biostatistics is providing a comprehensive manpower training program. Applicants should possess a Ph.D. or its equivalent in engineering or the physical sciences, and have a demonstrated or potential ability to teach at the postgraduate level and to undertake research in the fields of occupational health engineering and/or industrial hygiene. It is anticipated that an individual with industrial experience will be appointed at the Associate or Full Professor level, while the other appointment will be in the Assistant Professor rank. Terms of both appointments will be three years commencing July 1st, 1978, or as soon after as possible, and appointees will be eligible for consideration for tenure stream positions if and when they become available. Applications with curriculum vitae and the names of three referees should be sent to: Professor M.E. Charles, Chairman, Department of Chemical Engineering, and Applied Chemistry, University of Toronto, Toronto, Ontario, Canada M5S 1A4.

UNIVERSITY OF OTTAWA. **Engineering. Department of Civil Engineering.** Applications are invited to fill positions in the areas listed below. Responsibilities: To teach graduate and undergraduate courses in the Civil Engineering programme and to conduct research in the appropriate speciality. Qualifications: Ph.D. degree, Bilingualism an asset. At least 5 years of appropriate experience for appointment as Associate Professor. At least 10 years of appropriate experience for appointment as Full Professor. Areas of Specialization: A. **Geotechnical Engineering** (Positions available at junior and senior levels) 1) Foundation Engineering. 2) Shear Strength and Compressibility of Soils. 3) Soil Dynamics. 4) Flow in Porous Media. **B. Structural Engineering.** (Position available as Assistant Professor) 1) Earthquake Engineering. 2) Concrete Technology. 3) Steel Structures. C. **Water Resources and Pollution Control Engineering** (Position available as Assistant Professor) 1) Biological Waste Treatment 2) Advanced Waste Treatment 3) Water Resources Systems. Contact: Dr. R. G. Warnock, Chairman, Department of Civil Engineering, University of Ottawa, Ottawa K1N 9B4 Canada.

UNIVERSITY OF WATERLOO. **Engineering. Department of Civil Engineering.** 1. Assistant Professor in Transportation. 2. Ph.D. or dissertation in progress. 3. Teaching and research 4. Scale of Assistant Professor, depending on experience 5. Dr. T. H. Topper, Chairman, Department of Civil Engineering, University of Waterloo, Waterloo, Ontario. N2L 3G1. 6. September 1, 1978. 7. Open. First consideration will be given to those applicants who at the time of application are legally eligible to work in Canada for the period covered by this position. (Subject to the availability of funds).

UNIVERSITY OF WATERLOO. **Engineering. Department of Civil Engineering.** 1. Assistant Professor (other ranks may be considered). 2. Ph.D. - area of Soil Mechanics. Industrial and academic experience desirable. 3. Teaching and Research. 4. Dependent on qualifications. 5. Dr. T. H. Topper, Department of Civil Engineering, University of Waterloo, Waterloo, Ontario, N2L 3G1. 6. When available, subject to budget approval. 8. Applicants should be legally eligible to work in Canada for the period covered by this position.

UNIVERSITY OF WATERLOO. **Engineering. Department of Electrical Engineering.** For the 1977-78 academic year applications are invited for post-doctoral fellowships, research associateships and visiting professorships in the following areas: circuits and computer-aided design; systems and control; power engineering; solid state electronics; electromagnetic engineering; bioengineering and computer engineering. These appointments are for one or two year terms and are funded in full or in part from research grants and/or contracts. (Subject to the availability of funds). Inquiries shoud be sent to Professor K.D. Srivastava, electrical engineering department, University of Waterloo, Waterloo, Ontario, Canada. N2L 3G1. Effective date of appointment, June 1, 1978. Applicants should be legally eligible to work in Canada for the period covered by this position.

NOVA SCOTIA TECHNICAL COLLEGE. **Engineering. Department of Industrial Engineering.** The Department of Industrial Engineering at the Nova Scotia Technical College is looking for a new faculty member in the area of Management Information Systems. The candidate should possess or be near completion of a Ph.D. and be prepared to teach and do research in the areas of Database and Data Structures, Programming Languages, Systems Analysis and Design and Computer System Configuration. Salary and rank are commensurate with the applicants; qualifications. This position will be available starting 1st of July 1978. Interested persons should contact: Professor Peter Wilson, Acting Head, Department of Industrial Engineering, Nova Scotia Technical College, P.O. Box 1000, Halifax, Nova Scotia B3J 2X4.

UNIVERSITY OF REGINA. **Engineering. Department of Industrial Systems Engineering.** Assistant / Associate Professor for new program in Industrial Systems Engineering. Industrial experience required, preferably as an industrial engineer in manufacturing. Master's degree at least. A curriculum vitae together with the names of three referees should be sent to Dean J. B. Mantle, Faculty of Engineering, University of Regina, Regina, Saskatchewan S4S 0A2.

THE UNIVERSITY OF ALBERTA. **Engineering. Department of Mechanical Engineering.** Post-Doctoral Fellow or Research Associate in Fluid Mechanics and Heat Transfer. In particular blood flow and lubrication. Application to include curriculum vitae and names of three referees. Apply to Dr. C. M. Rodkiewicz, Department of Mechanical Engineering, The University of Alberta, Edmonton, Alberta, Canada T6G 2G8.

THE UNIVERSITY OF CALGARY. **Engineering. Department of Mechanical Engineering.** Post-Doctoral Fellow or Research Associate in Continuum (Solid) Mechanics. Several areas of research available both in the theoretical and numerical aspects. Application to include curriculum vitae and names of 3 referees. Apply to Dr. M. Epstein, Department of Mechanical Engineering, The University of Calgary, Calgary, Alberta, Canada T2N 1N4.

UNIVERSITY OF OTTAWA. **Engineering. Department of Mechanical Engineering.** Applications are invited for a faculty position in the area of Solid Mechanics (fracture mechanics, stress analysis) or Heat Transfer - Fluid Flow. Duties to include undergraduate and graduate teaching and research. Doctorate degree required. Bilingualism (English and French) an asset. Rank and salary determined according to qualifications and experience. Application to include curriculum vitae, details of experience and names of referees. Apply to Dr. A. S. Krausz, Chairman, Department of Mechanical Engineering, University of Ottawa, Ottawa, Ontario K1N 6N5.

ENGLISH

UNIVERSITY OF LETHBRIDGE. **Department of English.** Lecturer in introductory English Composition. To Teach Introductory English Composition (3 section Fall 1978; 2 sections Spring 1979; maximum 25 students per section), plus appropriate preparation, marking, tutorials, etc. Requirements: Applicants should have at least an M.A. degree in English, or equivalent, with experience and training in teaching English Composition. Nature of Contract: One ten-month terminal appointment: August 1, 1978 to May 31, 1979. Salary Scale: 1977-78, Lecturer $14,493 to $18,192 per annum. Deadline for Application: Until the position is filled. Write, including a Curriculum Vitae, transcripts and the names of three referees, to: Dr. L. R. Ricou, Chairman, Department of English, The University of Lethbridge, 4401 University Drive, Lethbridge, Alberta T1K 3M4.

TRENT UNIVERSITY. **Department of English Literature.** Applications are invited for a one-year sessional appointment at the floor of the Assistant Professor rank, to begin 1 July, 1978, in the fields of Modern English and Romantic literature. Some teaching off the main University campus may be required. Ph.D. and teaching experience in the above-named fields required. Applications, accompanied by full curriculum vitae and the names of three referees should be sent to Professor J.M. Treadwell, Chairman, Department of English, Trent University, Peterborough, Ontario, K9J 7B8.

UNIVERSITY OF GUELPH. **Department of Environmental Biology.** Food Microbiology. The Department of Environmental Biology, University of Guelph, has been authorized to recruit a faculty member in the area of Food Microbiology to augment its program in teaching and research. The position will be filled at the Associate Professor level since we are seeking a candidate with experience and an established research program. Responsibilities of the position include the following: Undergraduate Teaching. One course at the introductory level in Food Microbiology with approximately 45 students. One advanced course in Food and Dairy Microbiology with approximately 30 students. Graduate Teaching. One course in Food Microbiology. Supervision of graduate students. Research. The incumbent will be expected to work cooperatively with other researchers on campus in developing a strong program in Food Microbiology and to expand our liaison with the food industries. Salary will be commensurate with experience. The minimum salary for the Associate Professor rank is $22,168.00. Subject to final budgetary approval, the position will be available July 1, 1978. The appointment will be made in the tenure tract stream. Applications should include a complete resume and the names of three references and should be sent to the: Chairman, Department of Environmental Biology, University of Guelph, Guelph, Ontario N1G 2W1. Closing date: May 31, 1978.

FAMILY STUDIES

UNIVERSITY OF GUELPH. **Department of Family Studies.** Applications are being accepted for an Assistant or Associate Professor to undertake research and to teach both undergraduate and graduate courses in Family and Consumer Economics. The successful candidate will be expected to have strong research interests. A record of significant publications would be required for candidates being considered for the rank of Associate Professor and would be an advantage at either rank. Candidates should have an interest in working within a multidisciplinary environment. Rank and salary open; Ph.D. required. Position open until filled and is subject to final budgetary approval. Address enquiries, or applications with curriculum vitae and names of 3 referees to: Dr. R. M. Barham, Chairman, Department of Family Studies, University of Guelph, Guelph, Ontario, N1G 2W1.

FINE ARTS

CONCORDIA UNIVERSITY. **Faculty of Fine Arts.** The Faculty of Fine Arts of Concordia University, Montreal, Canada is accepting applications for a faculty position in its degree program leading to the Doctor of Philosophy in Art Education. As this program is characterized by an interdisciplinary approach to theory and research, applications from persons in disciplines such as philosophy of aesthetics, history or criticism, philosophy of education, anthropology, psychology and sociology are welcome. Applicants should give evidence of a research interest in the areas of art appropriate to their discipline, and should have teaching experience at the doctoral or post graduate level of education. Applications should be accompanied by a curriculum vitae, examples of research and/or publications, as well as three letters of recommendation. Deadline to receive applications is June 1st, 1978. Letters of inquiry and applications should be addressed to: Dr. James Victoria, Assistant Director, Graduate Division, Faculty of Fine Arts, Concordia University, MF Annex, 1455 de Maisonneuve Blvd. W., Montreal, Quebec, H3G 1M8 Canada.

UNIVERSITY OF WINDSOR. **School of Fine Arts.** Sculptor/Teacher. The School of Fine Arts of the University of Windsor is seeking a one-year sabbatical replacement for the school year beginning September, 1978 through May, 1979. The responsibilities include teaching two beginning sculpture courses, covering figure modeling and all basic sculpture techniques, and responsibility for metal casting foundry. Closing date: June 12, 1978. Please send slides, curriculum vitae, 3 letters or recommendation and any other pertinent information to: Professor Antonio P. Doctor, Director, School of Fine Arts, University of Windsor, Windsor, Ontario, Canada.

FOOD SCIENCE

UNIVERSITY OF GUELPH. **Department of Food Science.** Applications are invited for the following positions: 1. Assistant professor Ph.D. in food science from a recognized university with specialization in food chemistry. To teach undergraduate and graduate courses in food chemistry and develop strong research programs in this field, involving supervision of graduate students. Appointment will be on a probationary basis. The starting salary for assistant professor is $17,535.00 p.a. 2. Assistant professor - Ph.D. in food science from a recognized university with specialization in food quality and analysis. Interest and background in fruit and vegetable processing and thermobacteriology are desirable. Undergraduate teaching and research will be the main duties. Appointment will be on a contractually limited basis. The starting salary for assistant professor is $17,535.00 p.a. Applications should include a curriculum vitae, and names and addresses of three professional references and mailed to Dr. J.M. DeMan, Chairman, Department of Food Science, Ontario Agricultural College, University of Guelph, Guelph, Ontario. N1G 2W1. Closing date for applications is June 30, 1978. Ap-

pointments are subject to final budgetary approval.

FRENCH

MEMORIAL UNIVERSITY OF NEWFOUNDLAND. **Regional College at Corner Brook, Department of French.** 1. Undergraduate teaching position. 2. To teach French as a second language at the first and second year university level with emphasis on oral and written communication. 3. The College offers a full range of courses at the first and second year levels. 4. Salary and rank dependent upon qualifications and experience. 5. Curriculum vitae and names of three referees to: Mr. E. J. Ferriss Hodgett, Deputy Principal, Memorial University of Newfoundland, Regional College at Corner Brook, University Drive, Corner Brook, Newfoundland A2H 6P9. 6. September, 1978. 7. When position filled.

GEOGRAPHY

ATHABASCA UNIVERSITY. **Department of Geography.** Coordinator, Social Sciences. Description: Specialist in Geography with a broad background and teaching ability but with interest in Social Geography and/or man / land relationship. This person will assist in the preparation for delivery and later co-ordinator of two Geography courses currently approved together with an urban studies course already developed. Familiarity with an additional Social Science would be an added asset. Qualifications: Ph.D. or equivalent in Geography with teaching or media experience and a strong interest or demonstrated capabilities in the field of distance or adult education. Starting date of June 1, 1978 or as soon as possible thereafter. Starting salary dependent upon qualification, in the range of $18,084. to $24,000. This is a one-year appointment. Continuation will depend on 1979-80 funding. Letters of application and vitae must be received by 4 p.m. May 15, 1978, by: Administrative Board Co-ordinator, Personnel Services, Athabasca University, 14515-122 Avenue, Edmonton, Alberta T5L 2W4. Athabasca University is an open University chartered by the government of Alberta to provide learning services to adult citizens of Alberta through a diversified delivery system including opportunities for home base study and distance education.

UNIVERSITY OF TORONTO. **Department of Geography.** Applications are invited for a position at the rank of Assistant Professor, Department of Geography, St. George Campus, University of Toronto, to begin teaching September 1, 1978. This is a one to two year appointment with a possible extension to three years, subject to Canadian immigration approval. The candidate must have a Ph.D. and be prepared to teach a basic course in quantitative methods and a new first year innovative course in Canadian economic geography including Canada's role in the world economy, and problems of international economic development and trade. The Department is looking for a person who can communicate effectively with first and second year geography students and an increasing number from other disciplinary backgrounds. Preference will be given to candidates with demonstrated research and experience in developing countries or the North Atlantic Community. A letter of application with curriculum vitae and the names of three referees should be sent to Professor J.N.H. Britton, Department of Geography, University of Toronto, Toronto, Canada M5S 1A1. Applications should be submitted before May 15, 1978.

HEALTH EDUCATION

CONCORDIA UNIVERSITY. **Health Education.** Lecturer for summer course in Pathophysiology. June 26 - July 21, Ph.D. essential. Salary negotiable. Apply The Director, Health Education, Concordia University, 7141 Sherbrooke Street W., Montreal, Quebec H4B 1R6. Lecturer for summer course in Human Sexuality. July 31 - Aug. 12. Ph.D. essential. Salary negotiable. Apply The Director, Health Education, Concordia University, 7141 Sherbrooke Street W., Montreal, Quebec H4B 1R6.

HISTORY

LAURENTIAN UNIVERSITY. **The Department of History.** The Department of History invites applications for two 1978 summer session appointments, for the period July 4, 1978 to August 15, 1978. The positions are for teaching senior undergraduates: (a) American history; (b) Canadian history (en francais). Qualifications required are a Ph.D. degree, with some experience preferred. The stipend is $2,700. Applications should be addressed to Dr. R. M. Bray, Department of History, Laurentian University, Sudbury, Ontario, P3E 2C6, and must be received by June 1, 1978.

UNIVERSITÉ LAURENTIENNE. Le Département d'histoire sollicite des candidatures à deux postes pour l'été 1978, soit pour la période du 4 juillet au 15 août 1978. Les titulaires seront chargés d'enseigner aux finissants du premier cycle: a) l'histoire des Etats-Unis (en anglais); b) l'histoire du Canada. Ph.D. et expérience souhaitables. Traitement: $2700. Faire parvenir sa candidature avant le 1er juin 1978 au Professeur R.M. Bray, Département d'histoire, Université Laurentienne, Sudbury (Ontario) P3E 2C6.

HOME ECONOMICS

THE UNIVERSITY OF MANITOBA. **Faculty of Home Economics.** Faculty of Home Economics and Faculty of Education invite applications for an assistant professor with a Ph.D. or a Master's degree and experience in Home Economics and/or Education. Applicants must be certified teachers. Demonstrated competence in teaching and research will be given preference. Candidates with experience in or having a knowledge of the Canadian educational system are particularly invited to apply. Responsibilities will include: teaching communication skills to students in the Faculty of Home Economics; teaching curriculum and supervision courses with emphasis on the supervision of student teaching in the Faculty of Education; and development and implementation of adult education programs for specialists in the field. Salary and implementation of adult education programs for specialists in the field. Salary commensurate with qualifications and experience. Enquiries and applications, including a current curriculum vitae and three letters of reference, should be sent to Dr. Bruce E. McDonald, Dean, Faculty of Home Economics, University of Manitoba, Winnipeg, Manitoba R3T 2N2. Effective date of appointment: July 1, 1978; subject to budgetary approval.

HORTICULTURE

UNIVERSITY OF GUELPH. **Department of Horticultural Science.** Position in Ornamental Horticulture with emphasis on Herbaceous Greenhouse and Outdoor Plants. Position: Assistant Professor of Ornamental Horticuluture. Date Available: October 1, 1978 (subject to budgetary restraints). Description: This position involves teaching and research in physiology and/or morphology of herbaceous greenhouse and outdoor plants. The successful candidate should have a demonstrated productivity in plant physiology and/or morphology. He / she will be expected to work closely with the Ontario ornamental industry and to develop co-operative research projects with faculty in the ornamentals area. He / she also will be encouraged to develop research in areas of his / her special interests and training utilizing ornamental herbaceous plants. The teaching component involves participation in the development of courses in the greenhouse and outdoor herbaceous plants area at the Diploma, Undergraduate and Graduate levels. Salary: The salary is competitive and the level of appointment will depend on qualifications of the applicant. Benefits include a University and Federal retirement plan, life insurance, health insurance and major medical coverage, a dental insurance plan and sabbatical privileges. Applicants: The candidate must possess a Ph.D. in plant physiology, plant morphology, or horticulture or related fields. Personal data, transcripts of university records, names and addresses of three professional referees and a complete list of publications should be sent to: Dr. I.L. Nonnecke, Department of Horticultural Science, University of Guelph, Guelph, Ontario, N1G 2W1. Deadline for Applications: July 1, 1978.

INFORMATIQUE

UNIVERSITÉ DE SHERBROOKE. **Informatique.** 1. Professeur régulier à temps complet. 2. Diplôme de 2ème cycle ou formation jugée équivalente. Expérience en analyse, développement et gestion de projets d'informatique de gestion. Préférence accordée aux candidats susceptibles d'assumer la coordination d'un prorgramme. 3. Enseigner l'informatique orientée vers la gestion. Le cas échéant, coordonner un programme de 1er cycle en informatique de gestion. Participer éventuellement à l'élaboration et au developpement de projets dans ce domaine. 4. Traitement selon les échelles de la convention collective. 5. Faire parvenir un curriculum vitae, deux lettres de recommandation et toute information pertinente à Monsieur le doyen, Faculté des sciences, Université de Sherbrooke, Sherbrooke (Québec), J1K 2R1. 6. Date d'entrée en fonction: 14 août 1978. 7. Date de fermeture du concours: 1er juin 1978.

JOURNALISM

CORCORDIA UNIVERSITY. **Journalism.** A professorial appointment is offered in the Faculty of Arts and Science, to take effect 1 June 1978. Extensive journalistic experience is essential, experience of university teaching desirable. The successful applicant will teach in and co-ordinate the Minor in Journalism programme, which give students practical training in the journalist's craft as part of their undergraduate education in the liberal arts. Academic rank and salary will be commensurate with qualifications. Inquiries and applications should be addressed immediately to Associate Dean David McKeen, Room H-401, Concordia University, 1455 de Maisonneuve Blvd. West, Montreal, Quebec, H3G 1M8.

KINESIOLOGY

SIMON FRASER UNIVERSITY. **Department of Kinesiology.** A biomedical engineer is required for a faculty position in the Kinesiology Department at Simon Fraser University. The appointee will require to work in an interdisciplinary environment with biochemists, biologists, physiologists, physicians, psychologists and biomechanics faculty on research problems related to human movement and human performance. The appointee should be able to teach courses at the undergraduate and graduate level on systems theory and biomedical instrumentation and to participate in team-taught physiology and human factors courses taking particular responsibility for neurophysiology. The appointment, which is subject to the availability of funds and to approval by the Canadian Immigration Authorities, will probably be made at the assistant professor level with salary dependent on qualifications. Applications with the names of three referees should be sent to Dr. E. W. Banister, Chairman, Department of Kinesiology, Simon Fraser University, Burnaby 2, British Columbia, V5A 1S6.

SIMON FRASER UNIVERSITY. **Department of Kinesiology.** The Department of Kinesiology in cooperation with the faculty of Education intends to offer new theory and laboratory courses in biomechanics, motor learning and exercise physiology for those who intend a career in teaching Physical Education. Two positions at the Assistant Professor level, one as a joint appointment with the Faculty of Education will be filled, subject to the availability of funds in September, 1978. Candidates should possess a Ph.D. degree. They should have a developed research interest in biomechanics, motor learning or exercise physiology and a genuine desire to transmit a better fundamental understanding of human performance to potential teachers of Physical Education. Some experience of curriculum design is desirable. Appointment at the Assistant Professor level will be at a salary commensurate with experience. Practical experience in teaching team sports, individual sports or recreational activities will be advantageous. Application should be made to Dr. E. W. Banister, Chairman, Department of Kinesiology, Simon Fraser University, Burnaby 2, British Columbia, V5A 1S6.

UNIVERSITY OF WATERLOO. **Department of Kineslology.** Applications are being accepted for the position of 1. Assistant Professor in Biomechanics. 2. Ph.D. 3. Teach introductory courses in biomechanics and evaluation of human motor performance and share teaching of general first year course in biophysical basis of human movement. Conduct research in biomechanics. 4. Salary commensurate with experience. 5. Professor N. H. Ashton, Chairman, Department of Kinesiology, University of Waterloo, Waterloo, Ontario, N2L 3G1. 6. July or September 1st, 1978. 7. Until position filled. (Subject to the availability of funds.) Applicants should be legally eligible to work in Canada for the period covered by this position.

UNIVERSITY OF WATERLOO. **Department of Klnesiology - Health Studies.** Applications are being accepted for the position of 1. Assistant Professor. 2. Ph.D. and knowledge of disease processing or M.D. Biological background preferred. 3. Teach in one or more of the following areas: Community health, occupational health and psychosomatics. Conduct research in area of expertise. 4. Salary commensurate with experience. 5. Professor N.J. Ashton, Chairman, Health Studies Group, University of Waterloo, Waterloo, Ontario, N2L 3G1. 6. September 1st, 1978. 7. Until position filled. (Subject to the availability of funds). Applicants should be legally eligible to work in Canada for the period covered by this position.

LIBRARY

THE UNIVERSITY OF MANITOBA. **Library.** Reference Librarian, Architecture and Fine Arts Library. Term position: September 1, 1978 - August 31, 1979. The Architecture and Fine Arts Library serves primarily the faculty of Architecture and the School of Art. The incumbent reports to the Head of the Architecture and Fine Arts Library and shares with the Head the responsibility for developing the resources of the library. The incumbent also provides a range of services to library users in support of academic programs and, within the libraries' policies initiates and implements systems of organizing and retrieving a variety of library materials. Catalogued collections total 42,000 volumes but much additional material is also handled and processed at this location. Qualifications: A degree from an accredited library school plus a Master's degree in one of the subject areas, preferably in Fine Arts. An Honours degree and extensive practical experience will be considered. Two years Academic library reference experience including orientation and the use of computer based search services and personal qualifications of technical knowledge, judgement, initiative and resourcefulness. Salary: $12,500 plus depending on qualifications, 1978/79 salary under review. Apply to: Paul Wiens, Assistant Director for Administrative (Libraries), Elizabeth Dafoe Library, The University of Manitoba, Winnipeg, Manitoba, R3T 2N2.

THE UNIVERSITY OF SASKATCHEWAN. **Library.** Special Collections Librarian. The University of Saskatchewan Library invites applications for the position of Special Collection Librarian. The individual holding this position will be responsible to the Co-Ordinator of Public services. Duties will include the development of policies and procedures relating to all operations in Special Collections. This includes working with the appropriate managerial groups within the library and with the relevant faculty and departmental committees. The successful candidate will have a degree from an accredited library school, a thorough knowledge of French and an M.A. in Canadian Studies specializing in Western Canadian History. Further, candidates should have a minimum of three years experience in an academic library in the areas of rare books or special collections including some administrative responsibilities. Salary and rank will be commensurate with qualifications and experience. Salary scales are presently under review. Position available: July 1, 1978. Applicants are requested to send curriculum vitae and to arrange for a minimum of three letters of reference (sent directly by the referee) to be received no later than May 15, 1978. Apply to: J. D. Teskey, Assistant to the University Librarian (Administration) Library, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0W0.

LINGUISTICS

MEMORIAL UNIVERSITY OF NEWFOUNDLAND. **Department of Linguistics.** One year sabbatical replacement, preferably with specialization in experimental phonetics or dialectorogy. Appointment at level of lecturer or assistant professor, depending on qualifications. Write to Dr. J. Hewson, Department of Linguistics, Memorial University, St. John's, Newfoundland, A1B 3X9, enclosing a curriculum vitae and the names of three referees.

MANAGEMENT

UNIVERSITY OF TORONTO. **Faculty of Management Studies.** Applications are invited for a position as Assistant Associate Professor of Management Information Systems on the Faculty of Management Studies, University of Toronto. Candidates should possess a doctorate in a relevant field and some evidence of research abilities. Primary responsibilities include teaching MBA Ph.D. courses in MIS. Secondary interest in Management Science, Accounting or Operations Management would be useful The candidate should have a serious interest in supervising doctoral students and undertaking individual research. Applications should be submitted to: Professor Roger N. Wolff, Area Coordinator, Management Science & MIS, Faculty of Management Studies, University of Toronto, 246 Bloor Street West, Toronto, Ontario, Canada M5S 1V4.

MATHEMATICS

THE UNIVERSITY OF ALBERTA. **Department of Mathematics.** Applications

are invited for a number of Research Associates in different fields commencing in the academic year 1978-79. Candidates should have a Ph.D. or the equivalent and a research record. Duties include research and teaching one course for each of two terms. Salary approximately $10,000. Closing date June 1, 1978. A resume and names of some references to Prof. M.S. Klamkin, Chairman, Edmonton, Alberta T6G 2G1. Equal opportunity employer

CONCORDIA UNIVERSITY. **Department of Mathematics.** Part-time instructor required for Math 609 - Mathematics and other subjects in Summer Session, 1978. Classes will be scheduled in the period July 3 - 21. This is a course in the Master in the Teaching of Mathematics (MTM) Option C programme for elementary school teachers. Academic standing and experience of working with elementary school teachers required. Applicants should be able to relate mathematics to one or more of the following: plastic arts, music, science, language arts. Send applications before May 31, 1978 to: Dr. H. Proppe, Chairman, Department of Mathematics, Concordia University, 1455 Blvd de Maisonneuve W., Montreal, Quebec, H3G 1M8, Canada.

UNIVERSITY OF TORONTO. **History of Mathematics.** Tenure-stream position in History of Mathematics. The institute for the History and Philosophy of Science and Technology is searching for an established scholar (PH.D., publications, teaching experience) to direct its graduate program in history of mathematics, and teach at graduate and undergraduate levels, beginning in September 1978 or as soon as possible thereafter. Salary dependent on qualifications. Write to: Professor M.P. Winsor, Chairman, Search Committee, Institute for the History and Philosophy of Science and Technology, University of Toronto, Toronto, Ontario Canada M5S 1A1.

MEDICINE

THE UNIVERSITY OF ALBERTA. **Medicine. Division of Pulmonary and Critical Care Medicine.** Pulmonary Physician — Applications are invited for a position as an academic Pulmonary Physician — University of Alberta, Division of Pulmonary and Critical Care Medicine. Full time faculty position with base in chronic lung disease, home care, and tuberculosis. Applicants must have Royal College Specialty Qualification, an interest and ability in teaching, and an established research commitment. Send applications with complete curriculum vitae, and the names of three references to: Dr. E. G. King, Acting Director — Division of Pulmonary and Critical Care Medicine; Room 6-107, Clinical Sciences Building, University of Alberta, Edmonton, Alberta Canada T6G 2G3, or telephone area code (403) 432-6217.

MEMORIAL UNIVERSITY OF NEWFOUNDLAND. **Faculty of Medicine. Molecular Biology.** Pre and post doctoral positions are available for studies in the protein synthesizing system with special emphasis on ribosomes - topography, biogenesis and function - under various conditions of growth and development. Teaching opportunities available. Reply with resume to: Professor Bruce H. Sells, Laboratories of Molecular Biology, Faculty of Medicine, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, A1B 3V6.

MEMORIAL UNIVERSITY OF NEWFOUNDLAND. **Faculty of Medicine. Psychiatry.** Applications are invited for a full time University post in Psychiatry, a joint appointment between The Faculty of Medicine and The Waterford Hospital. The post is a geographic full-time position at the Waterford Hospital, a 400 bed psychiatric hospital with outpatient, day care and boarding care programs. The hospital is affiliated with the University. The teaching responsibilities include the coordination of postgraduate teaching at The Waterford Hospital, as well as participation in the teaching program of the Faculty of Medicine to under and post graduate students in medicine and other disciplines. Involvement in research is also expected. Seniority and salary will depend on qualifications and experience. Housing at reasonable rates and in attractive surroundings is available. Applicants should send a full Curriculum Vitae and the names of 2 or 3 referees to: The Chairman in Psychiatry, Faculty of Medicine, T3-11, Memorial University of Newfoundland, St. John's, Newfoundland, A1C 5S7. Canada.

QUEEN'S UNIVERSITY. **Medicine. Department of Psychiatry.** Kingston Psychiatric Hospital and Queen's University Department of Psychiatry have a position available for a psychiatrist to be responsible for clinical and teaching duties in this university affiliated teaching hospital. The hospital has an active research milieu and it would be an advantage if applicants had experience and interest in research. The rank of Lecturer / Assistant Professor will apply to the position, depending on experience. The salary ranges from $36,850 — $45,200 and will be on a contract basis. Applicants possessing a licence to practise medicine in Ontario, and certification in RCPS (Canada) or approved clinical status, may obtain further information or apply directly to Dr. C. M. Stevenson, Medical Director Kingston Psychiatric Hospital, Box 603, Kingston, Ontario K7L 4X3, or Dr. J. Waldron, Professor and Head, Department of Psychiatry, Queen's University at Kingston, Ontario.

UNIVERSITY OF TORONTO, **The Hospital for Sick Children. Division of Perinatal Medicine.** Duties in the Neonatal Intensive Care Unit of the Hospital for Sick Children and may include rotation through perinatal units for affiliated University hospitals in the immediate vicinity. Opportunities for research. Successful candidate will receive an academic appointment in the Department of Paediatrics, University of Toronto, commensurate with experience. Registration or eligibility for registration with the Ontario College of Physicians and Surgeons necessary. Possession of F.R.C.P. (C) or equivalent a requirement. Apply with curriculum vitae to Dr. Paul R. Swyer, Chief Division of Perinatal Medicine. The Hospital For Sick Children, Toronto, Ontario M5G 1X8, Canada.

UNIVERSITY OF TORONTO. **Faculty of Medicine. Department of Anaesthesia.** 600 bed teaching hospital in Toronto requires additional staff in Anaesthesia. Active staff appointment with teaching commitment available to suitably qualified individual or one year clinical assistantship for individual eligible for F.R.C.P. (C). All types of anaesthesia practiced with exception of anaesthesia for open heart surgery. Interest in Intensive Care or regional anaesthesia an asset but not essential. Vacancy now or during forthcoming year. Remuneration by arrangement according to experience. University rank - Lecturer, and will be made on an annual basis and renewed annually. For University departments.

UNIVERSITY OF TORONTO. **Faculty of Medicine. Department of Preventive Medicine and Biostatistics.** 1) Preventive Medicine and Biostatistics. 2) Research Associate. 3) M.Sc. or Ph.D. in Biostatistics or related area. Experience in analysing epidemiological data preferred. 4) Carrying out statistical analyses of data for epidemiological projects; to assist in the initiation and design of new projects. 5) $17,000 per annum. 6) Dr. G. R. Howe, Department of Preventive Medicine and Biostatistics, McMurrich Building, University of Toronto. 7) May 1, 1978. 8) Until position filled.

MUSIC

BRANDON UNIVERSITY. **School of Music.** Position: Voice Teacher, choral conductor and instructor in secondary music education methods. Qualifications: Graduate degree, doctoral preferred. Nature of Duties: Individual lessons and group classes in vocal technique. Instruction in secondary general methods, choral conducting, and choral repertoire. Supervision of practice teaching experiences. Will conduct the Brandon University Chorus and the smaller Brandon University Chorale which has won national recognition over a period of years. Rank and salary: Open. Appointment date: September 1, 1978. Closing date for applications: May 15, 1978, or when position filled. Applicants are requested to send a curriculum vitae together with the names and addresses of three referees to: Dr. Lorne Watson, Director, School of Music, Brandon University, Brandon, Manitoba. R7A 6A9.

PHARMACY

DALHOUSIE UNIVERSITY. **College of Pharmacy.** Applications are invited from suitably qualified candidates for a position on faculty to organize and teach elective courses in Hospital Pharmacy and Drug Information. The successful applicant is also expected to give lectures and seminars on related topics such as sterile preparations. An advanced degree and a Residency in Hospital Pharmacy are desirable. Research would be actively encouraged and facilities are available. The Faculty position and salary would be appropriate to the qualifications and experience of the successful applicant and is available from July 1, 1978 or as soon as possible thereafter. Applications with a full curriculum vitae and the names of two or three persons to whom reference can be made should be addressed to Dr. David K. Yung, Director, College of Pharmacy, Dalhousie University, from whom further particulars can be obtained. Telephone (902) 424-2530/2097.

DALHOUSIE UNIVERSITY. **College of Pharmacy.** Assistant Professor of Pharmacokinetics. Applications are invited for this new tenure-track position. The successful candidate will be expected to teach pharmacokinetics to both undergraduate and graduate students and to maintain an active research program. Cooperation with existing staff in developing and conducting clinical research projects is encouraged. A Ph.D. degree is required postdoctoral research and / or teaching experience in the area of clinical pharmacokinetics is desirable. The position is available from July 1, 1978, or as soon as possible thereafter. Applications, including a curriculum vitae, short description of research interest and names of three referees, should be sent to: Dr. David K. Yung, Director, College of Pharmacy, Dalhousie University, Halifax, Nova Scotia, Canada B3H 3J5.

DALHOUSIE UNIVERSITY. **College of Pharmacy.** Applications are invited from qualified Registered Pharmacists for appointment as Lecturer at the College of Pharmacy. The major proportion of the Lecturer's time will be spent at the College, with the responsibility for teaching non-prescription (O-T-C) medications, health-related accessories and skills for communicating knowledge in these areas to the public. Other assigned duties will include involvement in the structured practical training program. The successful candidate is expected to continue in the practice of Pharmacy for an agreed portion of the time. Applicants should possess at least a B.Sc. in Pharmacy degree. The position is available from July 1, 1978, or as soon as possible thereafter. Application, in the form of a letter, together with a curriculum vitae and the names and addresses of at least two references should be sent to Dr. David K. Yung, Director, College of Pharmacy, Dalhousie University, Halifax, Nova Scotia B3H 3J5.

PHILOSOPHY

SAINT MARY'S UNIVERSITY. **Department of Philosophy.** Applications are invited for the position of a limited-term nine-month appointment at a Junior level. Doctorate preferred. Duties include the following teaching responsibilities: Basic Logic; Introduction to Philosophy; Aesthetics and / or Feminism. The standard teaching load under a unionized collective agreement is nine hours (three teaching units) with an overload provision as applicable. Salary according to the current salary scale. Effective date of appointment September 1, 1978. Send applications to Dr. A.P. Monahan, Chairperson, Department of Philosophy, Saint Mary's University, Halifax, Nova Scotia B3H 3C3.

UNIVERSITY OF WINDSOR. **Department of Philosophy.** Symposium on Informal Logic. The Department of Philosophy of the University of Windsor announces a Symposium on Informal Logic at Windsor from June 26 to 28, 1978. Papers to be delivered by: Michael Scriven, Robert Binkley, Douglas Walton, John Woods, Alex Michalos, Howard Kahane, Peter Minjus, Ralph Johnson and Anthony Blair. For further information write: Symposium on Informal Logic, Department of Philosophy, University of Windsor, Windsor, Ontario, N9B 3P4.

PHYSICAL EDUCATION

McMASTER UNIVERSITY. **School of Physical Education & Athletics.** Applications are invited for positions which will incorporate primary responsibilities in the following areas of teaching, coaching and administration. Administration: Chairman, Women's Intercollegiate Athletic Programme. Chairman, Men's Intercollegiate Athletic Programme. Coordinator, Pool Programmes. Coaching: Women's — Gymnastics, Squash, Field Hockey. Men's — Basketball, Swimming, Volleyball, Wrestling, Tennis, Theory Teaching: Issues in Physical Education and Athletics. Programme Design. Activities Teaching: Badminton, Squash, Tennis, Track & Field, Gymnastics (men & women). Additional consideration will be given to teaching / coaching competencies in: health, philosophy, fitness and conditioning, applied game theory, figure skating, skiing. Level of Appointments will be commensurate with qualifications, A. Master's degree is normally expected. Involvement in Graduate Programme will be considered where appropriate. Letters of Application, together with a curriculum vitae, and two letters of reference should be sent to: Dr. Frank J. Hayden, Director, School of Physical Education & Athletics, McMaster University, Hamilton, Ontario L8S 4K1.

UNIVERSITY OF SASKATCHEWAN. **College of Physical Education.** The College is seeking applicants for three faculty and one administrative position effective July 1, 1978. It is expected that one of the positions will be permanent and three will likely be for one year. Duties which are to be filled include: Lecture Program: Care and Prevention of Athletic Injuries, Adapted and Corrective Physical Education. Activity Instruction: Gymnastics for Women, Gymnastics for Men. Coaching: Basketball (Men), Assistant Football, Hockey, Wrestling, Athletic Trainer. Athletic Director (Administrative Position). Other committee and general instruction duties will be assigned by mutual agreement. Candidates should apply to: Dr. J. Dewar, Dean, College of Physical Education, University of Saskatchewan, Saskatoon, Saskatchewan. S7N 0W0. Applications should include a personal, academic and work vita, names of at least three references and other pertinent information. The closing date for applications will be May 15, 1978. Salary and conditions of work are currently under negotiation.

POLITICAL SCIENCE

ROYAL MILITARY COLLEGE OF CANADA. **Department of Political and Economic Science.** 1. Assistant or Associate Professor, continuing position. 2. Ph.D. completed. 3. Undergraduate and graduate teaching in Comparative Politics (with particular interest in Third World) and Modern Political Theory. 4. Salary commensurate with qualifications and experience. 5. Dr. H. H. Binhammer, Head, Political and Economic Science, Royal Military College of Canada, Kingston, Ontario, K7L 2W3. 6. July 1, 1978. 7. When position filled.

PSYCHOLOGY

ATHABASCA UNIVERSITY. **Department of Psychology.** Coordinator, Social Sciences. Specialist in Psychology, preferably with concentration in early childhood and / or social psychology but with a broad background and teaching familiarity in introductory psychology. Familiarity with an additional social science would be an added asset. This person will assist in the preparation for delivery of several psychology courses currently approved, together with coordinating the delivery of these courses. Qualifications: Ph.D., or equivalent in teaching or media experience with strong interest or demonstrated capabilities in the field of distance or adult education. Starting date: 15 June 1978 or as soon as possible thereafter. Starting salary: Depending on qualifications, in the range of $18,084 - $24,000. Application deadline: Letters of application and vitae must be received by 4:00 p.m., 29 May 1978. Address: Administrative Coordinator, Personnel Services, Athabasca University, 14515 — 122 Avenue, Edmonton, Alberta, T5L 2W4. Athabasca University is an open university chartered by the Government of the Province of Alberta to provide learning services for adult citizens of Alberta through a diversified delivery system, including opportunities for home-based study.

CONCORDIA UNIVERSITY. **Department of Psychology.** The Psychology Department at Concordia University will have several leave replacement openings beginning June 1, 1978. Responsibilities include undergraduate teaching in such areas as Neuropsychology, Motivation, Learning, Research Methods, and participation in graduate seminars. Candidates should be prepared to make a research contribution to the department. Candidates should forward curriculum vitae, three letters of recommendation and publication reprints. Applications should be addressed to: Dr. Norman Segalowitz, Acting co-Chairman, Psychology Department, SGW Campus, 1455 de Maisonneuve West, Montreal, Quebec H3G 1M8 Canada.

LAKEHEAD UNIVERSITY. **Department of Psychology.** Tittle of position: Assistant Professor. Qualifications required: Ph.D. Nature of duties: A term appointment to teach introductory psychology and a specialty area such as psychometrics, human experimental, psychological or lear-

ning. Will teach three courses over a ten month period, one a repetition. Salary: $16,835 to $21,630 (1977-78) schedule. Send full curriculum vitae and names of three references to: Mr. Donald E. Ayre, Secretary of the University, Lakehead University, Thunder Bay, Ontario. P7B 5E1. Date of appointment: September 1, 1978. Closing date: When position is filled.

UNIVERSITY OF NEW BRUNSWICK. **Psychology Department.** The Psychology Department at the University of New Brunswick is anticipating approval of up to two positions for persons primarily interested in Applied Psychology. The Applied Psychology programme at U.N.B. has experienced rapid growth over the past three years. The Department has a Master of Arts degree at present and hopes to develop a Ph.D. programme in the near future. We are seeking individuals qualified to teach graduate courses in specialized areas of Applied psychology with additional teaching interests in testing, psychopathology or quantitative psychology-statistics. Priority will be given to persons with research and / or clinical experience in child psychopathology, learning disabilities, individual and family counselling, or therapeutic intervention strategies. Salary and rank will be commensurate with experience and university scales. Please send a vita and names of three referees and a description of research space and resource requirements to: Dr. H. Mikaelian, Chairman, Psychology Department, University of New Brunswick, Fredericton, New Brunswick, E3B 5A3. Closing date is May 31, 1978.

UNIVERSITY OF SASKATCHEWAN. **Department of Psychology, and the Psychology Division of the University Hospital.** 1. Joint tenurable position (half-time in each department). 2. Ph.D. is required, and applicants must have applied clinical work skills and a teaching commitment. 3. The half-time position with the Hospital will involve research and therapy for a wide variety of patients with pain problems who have been referred to the Pain Management Clinic; the Psychology Department component will involve teaching at the undergraduate and graduate levels, and graduate supervision in clinical, applied social-personality, or physiological. 4. Salary are in accordance with a scale now under negotiation. 5. Applications to be sent to K.V. McDowell, Head, Department of Psychology, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0W0. 6. Commences July 1, 1978. 7. When position is filled.

RECREATION

UNIVERSITY OF WATERLOO. **Department of Recreation.** 1. Assistant or Associate Professor in Recreation Administration. 2. Earned doctorate or its near completion in Recreation Administration or related discipline. 3. Ability to successfully supervise student theses and honors projects with a broad interdisciplinary view to graduate and undergraduate instruction and continued involvement and participation in professional organizations with a demonstrated competence and commitment to scholarship. 4. Assistant professor (minimum $17,100) Associate Professor (minimum $22,200). Salary commensurate with qualifications and experience. 5. Dr. David Ng, Acting Chairman, Department of Recreation, University of Waterloo, Waterloo, Ontario. N2L 3G1. 6. July 1, 1978, subject to budget approval. 7. Until position is filled. Applicants should be legally eligible to work in Canada for the period covered by this position.

RELIGION

THE UNIVERSITY OF MANITOBA. **Department of Religion,** Biblical Field with concentration on N.T. and Religions of the Hellenistic Period. Ph.D. and specialization in above areas. Term appointment beginning July, 1978. Junior Position. Applicants should be legally entitled to work in Canada. Address inquiries to William Klassen, Head, Department of Religion, University of Manitoba, Winnipeg, Manitoba R3T 2N2.

ROMANCE LANGUAGES

THE UNIVERSITY OF ALBERTA. **Department of Romance Languages.** Applications are invited from both men and women for a possible Sessional Lecturer position in Italian (leave replacement). Ph.D. preferred. Duties are to include undergraduate teaching in Italian language and literature. Salary will be approximately $12,000 plus modest travel for the period of appointment 1 September 1978 to 30 April 1979. Applications to Prof. J. A. Creore, Chairman, Department of Romance Languages, University of Alberta, Edmonton, Alberta, T6G 2E6 by May 15, 1978.

UNIVERSITY OF CALGARY. **Department of Romance Studies.** Professeur de littérature et civilisation Québécoise. Poste d'Instructeur (selon les disponibilités budgétaires) en études littéraires québécoises et en français comme langue seconde. Le candidat sera, de préférence, titulaire d'un doctorat avec de l'expérience dans l'enseignement du français par des méthodes audio-visuelles. Salaire: $13,100. pour l'année qui commence le 1er juillet, 1978. S'adresser, avec curriculum vitae et les noms de trois répondants, au: Head, Department of Romance Studies, University of Calgary, Calgary, Alberta. T2N 1N4.

SOCIOLOGY

McMASTER UNIVERSITY. **Department of Sociology.** 1. Applications are invited for two positions. 2. Ph.D. or equivalent. Teaching and research experience commensurate with level of appointment. 3. Specializations open. 5. Dr. P. E. Sheriff, Department of Sociology, McMaster University, Hamilton, Ontario. 6. July 1, 1978.

SPANISH

DALHOUSIE UNIVERSITY. **Department of Spanish.** Applications are invited for the possible position of an appointment at the assistant professor level. The applicant should have a Ph.D. with dissertation in the area of Modern Latin-American Literature, native or near native fluency in Spanish and English, and teaching experience preferred. Duties will include teaching in both Spanish and English of language and Latin-American study courses. The effective date of appointment will be July 1, 1978. Applications with curriculum vitae should be addressed to Dr. Sonia Jones, Chairwoman, Department of Spanish, Dalhousie University, Halifax, N.S. B3H 3J5.

THEOLOGY

THE UNIVERSITY OF BRITISH COLUMBIA. **Vancouver School of Theology.** Thomas Merton Symposium, Vancouver School of Theology (UBC) May 11-13, 1978. Papers to be given by scholars on the varied aspects of Merton's work, from theological to literary. For further information, write: The Thomas Merton Symposium, Continuing Education, Vancouver School of Theology, 6000 Iona Drive, Vancouver, B.C. V6T 1L4.

CONCORDIA UNIVERSITY. **Department of Theological Studies.** 1. Rank Open. 2. Completed Doctorate. 3. Undergraduate and graduate work in the History of Christianity. 5. Chairman, Department of Theological Studies, Concordia University, Loyola Campus, 7141 Sherbrooke Street West, Montreal, Quebec. H4B 1R6. 6. Appointment contingent upon final budgetary decisions of the University.

VETERINARY SCIENCES

UNIVERSITY OF SASKATCHEWAN. **Department of Veterinary Physiological Sciences.** The Department of Veterinary Physiological Sciences invites applicants for a lecturer position for an eight-month period beginning September 1, 1978. Candidates should have a M.Sc. or Ph.D. in the area of neurophysiology. The successful applicant will give lectures, laboratories and tutorials to veterinary students in introductory physiology and neuro-sciences classes. Laboratory space and equipment is available for a modest research program. Applications with a curriculum vitae and names of two referees should be sent to: Dr. J. G. Manns, Head, Department of Veterinary Physiological Sciences, University of Saskatchewan, Saskatoon S7N 0W0.

WOMEN'S STUDIES

CANADIAN RESEARCH INSTITUTE FOR THE ADVANCEMENT OF WOMEN/INSTITUT CANADIEN DE RECHERCHES. The Institute has a particular interest in seeing new research being undertaken into matters of women's experience. The Institute, therefore, announces four grants-in-aid, to the value of $2,000 each, to support the initiation of research related to the general topics of women and work and women's health. The applications will be assessed in the fall and grants presented at the Annual Meeting at Quebec City, November 9-11. University affiliation is not a necessary requirement. Applicants should send a short autobiography and a brief statement (approximately 2 typed pages, 500 words) of the nature of their topic and their proposed research methods to Marion Porter, Canadian Research Institute for the Advancement of Women, Suite 415, 151 Slater St., Ottawa, Ontario K1P 5H3, by June 1.

VISUAL ARTS

YORK UNIVERSITY. **Department of Visual Arts.** Associate Professor. Senior painter with strong professional and exhibition credentials. Minimum five years university related experience at both undergraduate and graduate levels. Curriculum vitae and names of three referees. Apply to Chairperson, Search Committee, Department of Visual Arts, Faculty of Fine Arts, York University, 4700 Keele Street, Downsview, Ontario. Deadline for application is July 15, 1978.

ZOOLOGY

THE UNIVERSITY OF BRITISH COLUMBIA. **Department of Zoology.** Applications are invited for two (2) post-doctoral Fellow Positions in the Department of Zoology, University of British Columbia, for studies on cardiovascular and respiratory physiology of diving birds and mammals. Salary $10,000 - $12,000 p.a., depending on experience. Successful candidates may be expected to do some teaching. Curriculum vitae and references should be submitted to Dr. D. R. Jones, Department of Zoology, University of British Columbia, 2075 Wesbrook Place, Vancouver, B.C., Canada V6T 1W5. Closing date when position filled.

FACULTY EXCHANGE

THE FACULTY EXCHANGE CENTER, a non-profit, faculty administered organization, helps to arrange exchanges of college and university faculty within North America and overseas where the language of instruction is English. For information write to Faculty Exchange Center, Franklin and Marshall College, Post Office Box 1091, Lancaster, Pennsylvania 17604.

PERSONAL

CAMBRIDGE, England. Small, Modern House available September, 1978 through June 1979 (8 months minimum). Moderate rent. For details write Professor Huxley, Classics, University of Victoria, Victoria, B.C. V8W 2Y2.

LATE ADS

DANCE

YORK UNIVERSITY. **Faculty of Fine Arts. Dance Department.** An eight month sessional appointment commencing September 1, 1978. Lecturer with university experience in the teaching, dance therapy, and contemporary dance areas. Strong background required in Rudolph's Laban's approach to educational dance and also wide experience in composition and in teaching dance to both children and adults. Address applications to: Grant Strate, Acting Chairman, Dance Department, Faculty of Fine Arts, York University, 4700 Keele Street, Downsview, Ontario, M3J 1P3. Application deadline June 1, 1978.

MEDICINE

UNIVERSITY OF TORONTO. **Faculty of Medicine. Department of Radiology.** 1. Department: Radiology. 2. Title: Radiologist-in-Cheif, The Hospital for Sick Children, Associate Professor/Professor, Department of Radiology. 3. Qualifications Required: Certification in Radiology, competence in Paediatric Radiology and fellowship in the Royal College of Physicians - Canada or its equivalent. 4. Nature of Duties: Direction of all aspects of patient care, teaching and research within the Department of Radiology including programs of quality control. 5. Salary: Commensurate with qualification and experience. 6. Person to Whom Enquiries Should be Sent: Mr. L. B. Murray, Associate Administrator, The Hospital for Sick Children. 7. Effective Date of Appointment: To be negotiated. 8. Closing Date of Receipt of Applications: June 1st, 1978.

MUSIQUE/MUSIC

UNIVERSITÉ D'OTTAWA. **Département de Musique.** Education musicale; Fonctions: participer à l'élaboration et à la coordination du programme de cours en éducation musicale offerts par le Département de Musique. Environ un tiers de la charge d'enseignement pourra être dévolu à une discipline connexe, telle l'écriture, l'interprétation, etc. Qualifications: au moins une maîtrise en musique ou en éducation musicale (ou l'équivalent); connaissance approfondie des différents systèmes (Ontario & Québec) et méthodes d'éducation musicale; solide expérience de l'enseignement de la musique aux niveaux primaire et secondaire. Le (la) candidat(e) devra pouvoir enseigner dans les deux langues officielles de l'Université, le français et l'anglais. Le rang professoral et le traitement seront établis en fonction des titres et de l'expérience du (de la) candidat(e). Traitements minima en 1977/78: Titulaire $27,351, Professeur agrégé $21,189, Professeur adjoint $16,474, chargé de cours $12,801; bénéfices marginaux très avantageux. Les candidatures, avec curriculum vitae et les noms et adresses d'au moins trois répondants, devraient être soumises à: Prof. Keith MacMillan, directeur, Département de Musique, Université d'Ottawa, Ottawa, Ontario, K1N 6N5. Le poste sera rempli le 1er juillet 1978.

UNIVERSITY OF OTTAWA. **Department of Music.** Music Education duties include co-ordination of departmental music education program; about one third teaching time should be spent in another musical discipline, such as Performance, Theory, etc. Qualifications: at least Master's degree or equivalent; good knowledge of music education methodologies and of schools systems in Ontario and Quebec; good measure of classroom experience; able to teach in English and French. Rank and salary commensurate with qualifications and experience (1977-78 salary floors were, for Full Professor: $27,351, Associate Professor $21,189, Assistant Professor $16,474, Lecturer $12,801, plus extensive fringe benefits). Applications including up-to-date curriculum vitae and names and current addresses of at least three referees should be addressed to Keith MacMillan, Chairman, Department of Music, Department of Music, University of Ottawa, Ottawa, Ontario, K1N 6N5. Appointment effective July 1st, 1978.

OCEANOGRAPHY

DALHOUSIE UNIVERSITY. **Department of Oceanography.** The Oceanography Department at Dalhousie University is seeking a biological oceanographer with specialization in Fish Biology to develop a research program, to teach graduate courses, and to work with graduate students on topics dealing with marine fishes. The appointment will lead to tenure, and will probably be made at the Assistant Professor level. The Oceanography Department is a component of a community of active research laboratories in the Halifax area whose dominant interest is marine science. Ship time is available on research vessels, and excellent research aquarian facilities exist. Applicants should send a letter describing their research interests, a copy of their curriculum vitae, and the names of three people willing to serve as references to: Dr. P. J. Wangersky, Chairman, Oceanography Department, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4J1.

PHYSICAL EDUCATION

COLLEGE OF CAPE BRETON. **Department of Physical Education.** The College of Cape Breton invites applicants for a position of lecturer or assistant professor in the department of physical education / athletics. 1. Rank: Lecturer or Assistant Professor. 2. Qualifications: Master's degree. Competence in athletics is considered an asset. Successful completion of a degree program of post-secondary studies in physical education sport or recreation is a minimum requirement. 3. Duties: The teaching of physical education to first-year students (physical education majors) to cooperate in the delivery of the B.A. Community studies programme; an assignment in the varsity and intra-mural programme: assisting in the initiation of new programmes within the department of the College of Cape Breton. 4. Salary: Commensurate with qualifications and experience. 5. Professor C. R. Buchanan, Chairman, Department of Physical Education & Athletics, College of Cape Breton, P.O. Box 5300, Sydney, Nova Scotia, B1P 6L2. 6. Effective date of appointment July 1, 1978. 7. Closing date for applications May 31, 1978.

SOCIOLOGY

THE UNIVERSITY OF ALBERTA. **Department of Sociology.** Specialist in Quantitative Economic-Demographic Models. University of Alberta seeks a Research Associate to work under its programme of cooperation and exchange with the United Nations Centre Latino-americano de Demografia in Santiago, Chile. An appointment for one year is envisaged in the first instance with possibility of renewal for another year. For complete position description and other details write to Karol Krotki, Sociology, University of Alberta, Edmonton, Alberta, T6G 2H4.

Inflation protection for retired employees*

by Herbert Heaton

In 1946, a senior secretary of the Rockefeller Foundation retired on a substantial pension of $80 a month, and she was without Social Security benefits because employees of non-profit organizations were not then covered. Should she still be collecting her original pension, it would buy only a couple of weeks' groceries.

What are an employer's responsibilities in such circumstances? In sequence since the postwar period, the foundation asked itself:

- ☐ Should we supplement retirees' pensions to offset inflation losses?
- ☐ Can we afford it?
- ☐ Should we provide equity annuities as a buffer against inflation?
- ☐ On a person's retirement, should we provide a pension that is indexed to the cost of living?

During these years, the foundation arrived at yes answers to all these questions. Six times in 30 years we supplemented the pensions of retired personnel. For a decade, we funded a portion of each pension in an equity annuity as the best available protection against inflation. But since the mid-1960s, inflation and stock prices have not moved together.

Finally, we tested the possibility of an indexed plan. To our surprise, we found that we could provide an open-ended indexed plan at approximately the same cost as an equity annuity.

Elements of an indexed plan

Start with the viewpoint that inflation is a change in a unit of measurement and the conclusion follows that indexing a pension should not add to its cost. Inflation affects the transfer of wealth but can neither increase real wealth nor diminish it. Thus every inflationary increase in a purchase price is also an increase in a selling price, and all increased costs for one side of a transaction are also increased revenues for the other side.

If an annual medical examination is an employee benefit, inflation does not change the examination; it changes the monetary unit used to pay for the examination and increases the number of units required. If, despite inflation, we use a fixed number of monetary units in payment, the examination itself must be reduced and some of its features eliminated. Like these examinations, fixed-dollar pensions decrease in value with inflation.

So much for theory. What are the mechanics of indexing a pension without increasing its cost?

Standard annuity tables show three of the four elements determining payment amounts, whether for pensions or mortgage amortization. The three elements are assumed interest rate, principal amount, and period of time (which in the case of pensions is taken from mortality tables). The fourth element is administrative cost. I'll discuss the first three in detail.

Assumed interest rate: In the absence of inflation and in a thriving economy, interest should be about 3%. Interest rates on long-term bond offerings are said to be set at the anticipated inflation rate plus the basic 3%, which is sometimes referred to as "true" interest.

Unless we know the magic rule of 70, most of us are unaware of the fantastic power of interest rates. The rule states that by dividing an interest rate into 70, we find the number of years needed to double our money. Thus at 2% interest it takes 35 years to double, at 7% it takes 10 years, and at 10% it takes only 7 years.

Considering it negatively, if your life expectancy is 20 years when you retire and inflation continues at 7%, after 10 years the value of each dollar of your annuity will have declined to 50 cents. Before you die, it will have dropped to a quarter. Given the same situation but an inflation rate of 10%, the purchasing power of your pension will be cut before you die to one-eighth of its beginning value, or 12½ cents on the beginning dollar.

Principal amount: Entering an annuity table with a 3% interest factor, let's assume that it takes $100,000 to produce an annuity of $8,500. Therefore it takes $10,000 to produce an annuity of $850, $5,000 to produce an annuity of $425, or $1,000 to produce an annuity of $85.

If the person starts with a pension of $8,500 and inflation during his or her first year of retirement is at a 5% rate, to break even he or she will need a $425 increase in the pension. Where will the necessary $5,000 principal come from?

With inflation at 5%, the principal fund should earn 8%, not the 3% the annuity table is based on. In other words, earnings on the principal fund should be $8,000, making an extra $5,000 available to buy another life-time annuity of $425. The additional annuity imposes no cost on the employer or insurance company other than its initial purchase.

In the absence of inflation, a 3% interest assumption is appropriate, and there is no difference between the cost of an indexed pension and one that is not indexed. Both pensions pay the same benefit.

But if the pension is not indexed, and we move from an inflation-free period to one with inflation, the extra interest earnings go to the employer and the retired person loses an equivalent amount in the value of his pension.

Those who point with horror to the enormous cost of indexing pensions are looking at one side of the picture only. Both sides become clear when accounting statements are prepared in units of general purchasing power (as proposed by the Financial Accounting Standards Board). Such statements measure a corporation's gains during an inflationary period when long-term debt is payable in a fixed number of dollars.

When the long-term debt is for pensions, the corporation's gains and its pensioners' losses are exactly equal. If pensions are indexed, neither side of the pension transaction gains from inflation or its absence at the expense of the other side.

Recognizing that interest rates do not move precisely with inflation, we at the foundation worried about our cost commitment. We achieved cost control by indexing to both an interest rate and an inflation rate and using the lesser of the two.

The cost to the foundation, of course, is similar to the cost of an equity annuity. If we funded our pensions on a 5% reserve basis rather than a 3% basis, the plan would cost the foundation 13% less.

Period of time: Because no insurance company offered an indexed annuity, the Rockefeller Foundation was obliged to set up a trust fund and operate its own plan. Was it reasonable to self-insure a group of fewer than 300? Could a self-insured plan afford the risk of chance deviations from average life expectancies, as shown in mortality tables?

We were assured that the risk was minimal. Look at the calculations of the difference between annuities and straight interest in deriving an annual yield from $10,000. Assume a 10-year life expectancy and 3% interest:

Annuity	$1,172	391%
Interest	(300)	(100)
	$ 872	291%

Now assume a 25-year life expectancy and 8% interest:

Annuity	$ 937	117%
Interest	(800)	(100)
	$ 137	17%

The 25-year expectancy is closer to today's realities, and the second calculation shows that interest rates are now the major payout determinant. In other words, the mortality risk is relatively minor, but the inflation risk is tremendous. Instead of dumping the inflation risk on our hapless retired employees, the Rockefeller Foundation, knowing that it could cope with the mortality risk, chose to assume it.

The adopted plan

As finally established in April 1975, the foundation's indexed plan provides a defined benefit based on years of service and final average salary, thereby protecting the pension benefit from inflation before the employee's retirement. After retirement, pensions escalate annually if the cost of living has increased.

The first 4% increase automatically is applied to the cost-of-living rise. Above 4%, we match the increase in the cost of living only to the extent that the total increase in the annuity does not exceed the average prime interest rate for the year, less 3% (the true interest which should have been earned in the absence of inflation).

This formula would have covered 90% of the inflation this country experienced from 1955 to 1975.

* Herbert Heaton, "Inflation Protection for Retired Employees," Harvard Business Review, September-October 1977, Copyright © 1977 by the President and Fellows of Harvard College; all rights reserved.

Proposed Amendment - April 10, 1978 - Budget Resolution 16: Registered Retirement saving plan

In response to pressure from consumer groups some significant changes are proposed for registered retirement savings plans which may be briefly summarized as follows:

Maturity of a plan

At present: A plan may be matured, that is, exchanged for a life annuity at any time before the annuitant's 71st birthday.

As proposed: The maturity period will be restricted to the interval commencing at age 60 and ending with the close of the year during which the annuitant becomes 71.

Options at the maturity of a plan

At present: Aside from collapsing the plan, an annuitant's only other option is to acquire a life annuity from a life insurance company.

As proposed: In addition to the foregoing option, two alternatives will become available.

(1) The annuitant may purchase a term-certain annuity with payments continuing for the number of years remaining before the annuitant attains age 90.

(2) The annuitant may transfer his or her savings into a new type of investment vehicle — a Registered Retirement Income Fund — from which payment will be made in each year of amounts which will exhaust the fund when the annuitant reaches age 90.

Both of these options involve term-certain annuities, as opposed to life annuities, and may be purchased from any financial institution authorized to issue R.R.S.P.'s. Life annuities, on the other hand, may only be purchased from life insurance companies.

Should an annuitant die before age 90, the remaining benefits of a registered retirement savings plan may pass to a spouse. Benefits remaining for any other beneficiaries shall be required to be commutable and shall be deemed to be received by the annuitant immediately before death.

The budget resolution, as well as the Minister's comment, leaves many unanswered questions which must await the final legislation for solution.

Charles Hebdon